INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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VOCATIONAL EDUCATION FOR RELIEF AND RECONSTRUCTION

Help your fellow members of the A.V.A. discuss and decide the momentous questions that confront those interested in industrial-arts and vocational education at the convention at Detroit, December 6–9.

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Then there are the famous motor factories and other large industrial establishments that are worthy of your serious study.

Don't fail to avail yourself of the opportunity which the A.V.A. convention at Detroit offers you.

THE ANNUAL INDEX

The present issue finishes Volume 22 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. A title-page and index have been prepared and will be sent upon request to any reader.

THIS MONTH'S COVER

The cover picture on this issue shows a student at a lathe in the pattern-making department of the Boys' Technical High School, Milwaukee, Wis.

Mr. Gustav A. Mickelson is the instructor in charge of this work.

Articles Indexed—The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," and "Education Index."

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Editorial Contributions.—The Editor invites contributions bearing upon Industrial Arts, Vocational Education, Manual Training, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

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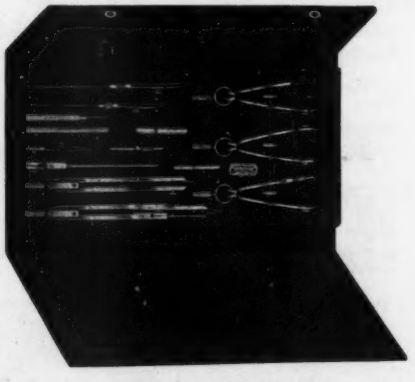

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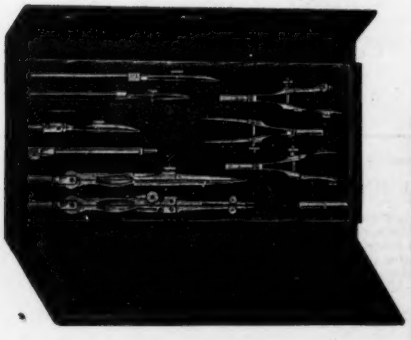

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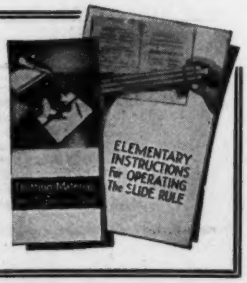


INDUSTRIAL ARTS and VOCATIONAL EDUCATION
December, 1933
Vol. 22, No. 12

Detroit--The Convention City

Earl L. Bedell

Assistant Director Vocational Education, Detroit, Michigan

Detroit has much to offer to the A.V.A. visitor. The author describes the industrial arts and vocational education offered in the schools of this extraordinary convention city.

THE Detroit metropolitan area offers a variety of interesting developments to the delegates attending the eighth annual convention of the American Vocational Association. There are a million and a half living in Detroit proper and an additional million live in the adjacent towns and cities. Although the city has become famous for its automobile manufacturing, there is no similar area in which so many diversified industries are located. It lies in the heart of that territory which proclaimed in its original articles of government that *"schools and the means of education shall forever be encouraged."*

The Detroit public schools have the distinction of offering an educational program from the kindergarten through college, even to a recognized graduate school. The schools are organized on the 6–3–3 plan; that is, six years in the elementary schools, three years in the intermediate schools, and three years in the high schools.

There are 192 elementary schools. The building program not being completed, there are not enough intermediate schools and it is still necessary to house seventh and eighth grades in some elementary-school buildings. In order to give shopwork and drawing to the boys and home-economics work to the girls in these elementary schools, "centers" are maintained in 68 elementary schools.

The Administrative Organization

Vocational education below college grade in Detroit has been organized this year as a division of the public-school system under the direction of an assistant superintendent. This division includes (1) commercial education; (2) guidance and placement; (3) technical and trade schools; (4) industrial education and industrial arts in elementary, intermediate, and high schools; and (5) home-economics and trade schools for girls. The department of vocational education, so called, is a part of this large division of the school system and has supervisory charge of instruction, equipment, etc., in all the foregoing branches with the exception of commercial education and guidance and placement.

Cass Technical High School, Detroit, Michigan.

The Wilbur Wright Co-Operative High School, Detroit, Michigan.

The department of vocational education is in charge of a director and an assistant director. Three subject supervisors are employed full time in that capacity, having charge, respectively, of mechanical drawing, clothing, and food work. Each of the following subjects, metal work, printing, and automobile mechanics, is supervised by a man who gives part of his time to teaching. Supervisors of instruction in this department give their services throughout the school system in their respective subjects.

Schools

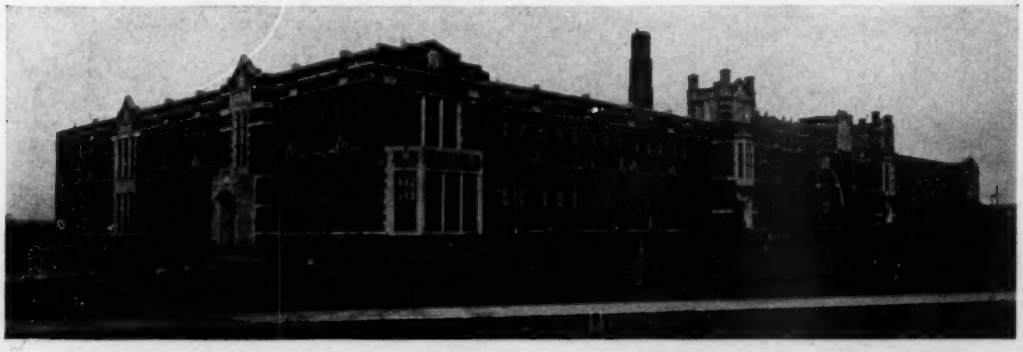
There are 21 intermediate schools with an average capacity of 2,000 pupils. These schools are generally equipped to teach household mechanics, woodwork, general metal work, printing, or auto mechanics, and mechanical drawing. There are also provisions for teaching foods, clothing, and homemaking to the girls.

There are 14 high schools. Five of these high schools have specialized shops for the teaching of such subjects as patternmaking, machine-shop practice, automobile mechanics, and electrical construction. The function of the shopwork is definitely vocational. In each of the remaining high schools there is only one general shop. Home-economics laboratories are provided in all high schools.

The following schools are devoted exclusively to vocational education: The Cass Technical High School, the Girls' Vocational School (2 units), the Boys' Junior Trade School, the Building Trades School, the Wilbur Wright Coöperative High School, and the School of Commerce (2 units).

The Technical High School

The practice of education in this country differs as to the organization of technical education. Some cities have centrally located technical high schools, others have no such schools, but instead have technical departments in all their high schools. This city is gradually shifting from the first plan to a combination of both plans. Although our technical high school has a capacity of 4,500 students, the demand for technical education in this city far exceeds this number. Techni-

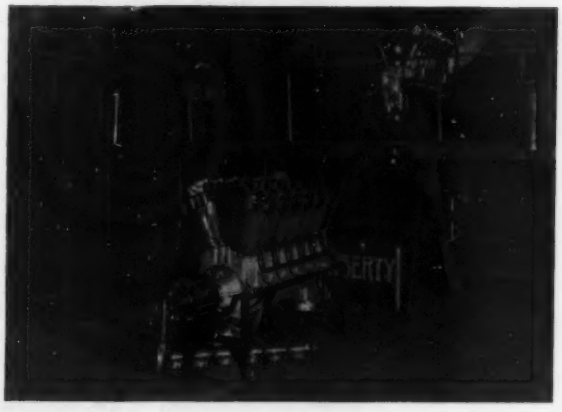


The Cleveland Intermediate School is typical of Detroit's intermediate school buildings. Capacity 2240. The five shops include household mechanics general shop, general woodshop, general metal shop, auto-mechanics shop, and a printshop. In addition there are two drafting rooms, two cooking rooms, and two sewing rooms.

The Cooley High School is one of Detroit's newer high schools.

cal curriculums are, therefore, being introduced in some of our academic high schools.

Cass Technical High School is a senior high school organized on the basis of vocational curriculums. These curriculums provide a general high-school education combined with vocational studies to the extent of 33 per cent of the actual school time. An attempt is being made to relate the subject matter in academic subjects like English and mathematics to the needs of the vocation.



Aeronautics is an important curriculum in Cass Technical High School, Detroit, Michigan. This shows engines mounted for testing.

The following curriculums are offered at Cass Technical High School: Mechanical (metal trades and drafting), electrical, automotive (includes refrigeration), aëronautical, building and architectural drafting, chemical and metallurgical, printing, commercial art, music, and institutional home economics.

The Coöperative High School

The Wilbur Wright Coöperative High School is now a well-established school. It is designed for boys who wish to become skilled workmen and secure, at the same time, a high-school education. Most of the boys who enter this school are too young to enter industrial employment. Besides this, they do not have sufficient shop training to hold a coöperative job. Then too, it is advisable in all cases to have information concerning character and mechanical abilities before recommending them to employers. For these reasons all students are enrolled for full time during the tenth grade.

Under the coöperative plan the pupils work in pairs, one is in school, while his partner is on the job. They change every two weeks. An interesting feature of the academic program is the individualized instruction by which boys work at their own rate of speed. It is possible for a boy to begin any time and finish at any time. All the work on the coöperative plan is sponsored by some organization or group through their respective educational departments.

The following trades are taught in the Coöperative High School:

All Day Trades: Auto mechanics, machine-shop practice, painting and decorating, and printing.

Coöperative Courses: Automotive service, commercial, manufacturing, steam engineering, and printing.

The Junior Trade School

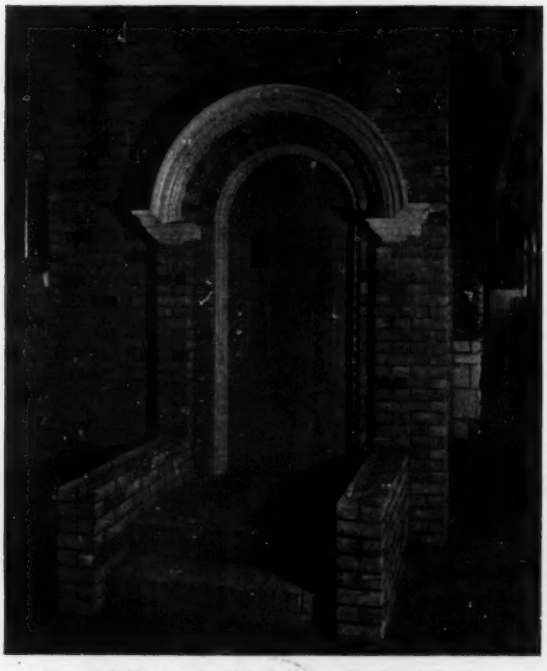
The George Junior Trade School, as the name implies, is designed to serve the junior worker. Employ-

Heating and ventilating is taught in the Wilbur Wright Coöperative High School, Detroit, Michigan.

ment conditions have reduced the part-time instruction to a minimum. In the meantime, the all-day classes have increased tremendously. Generally speaking, the school is now occupied by boys 15 to 17 years of age who have completed at least the sixth grade, who have shown interest and ability in shopwork, and for some reason or other do not care to continue school in the regular classes. The school is operated on the Smith-Hughes plan. The occupations represented are metal working, electrical, woodworking, acetylene welding, patternmaking, and drafting.

The Building Trades School

The Building Trades School had its beginning in 1924 with classes in plastering and bricklaying. This school was organized as a strictly apprenticeship school in coöperation with the established building trades. It is sponsored by a committee composed of representatives of both the trades unions and the employers' association. The present employment conditions have made it seem advisable, however, to organize some of the day trade classes. Under ordinary conditions the boys spend one day a week in school and the remainder of the time on the job. The trades now taught in this school are electrical, bricklaying,



Bricklaying in the Building Trades School.

plastering, and metal lathing. For a period of three years no new apprentices have been indentured in these trades in Detroit. The indications are that there will be a renewed demand for skilled workers in the building trades. It is in anticipation of this demand that additional all-day trade classes are being conducted in the electrical, plastering, and bricklaying trades.

An interesting feature of the Building Trades School is the training program set up to train a highly specialized type of engineers' and architects' assistants in building industries. These apprentices will be trained to handle drafting, layout, inspecting and estimating. There has been also an attempt to meet the changing conditions of the industry by offering to journeymen trade-extension courses in the newer methods of their trades. The extended use of electrical household appliances, such as refrigerators, oil burners, and air conditioners, has led to trade-extension courses in the repair of household appliances with the idea that these courses will offer additional opportunities for employment.

The Girls' Vocational School

The Girls' Vocational School offers opportunity for special types of training to girls of intermediate and high-school rank. It is the purpose of the school to provide vocational training for girls who must go to work at a relatively early age. The school trains for positions in dressmaking shops, alteration departments of stores, for positions in cafeterias or tea rooms as waitresses or helpers, for positions in offices as filing clerks and typists, for positions as clerks in offices of doctors and dentists, and for positions in homes as assistants to mothers. The school also gives careful training in the vocation of homemaking.

At the end of the required attendance in school, the girls, if successful, are awarded certificates of accomplishments. These certificates are given each year in June.

Department of Guidance and Placement

The department of guidance and placement is a centralized agency in charge of the complete guidance program of the public schools.

Its principal activities are: Personal, educational, and vocational guidance; studies of Detroit occupations; and placement and coördination.

The placement service was established in 1921. At the same time, the first individuals, with the title of counselor, were assigned to positions in the schools. The central office of the department is the point of contact for the young people making the transition from school to employment. The office assists through helpful counsel and information in the many adjustments required.

School counselors provide guidance through group conferences and individual interviews. There are no special counselors in the elementary schools. In the intermediate (junior high) schools, there are two counselors, one man and one woman. In the senior high schools, the house principals or study-hall counselors are responsible for the guidance program. In both the intermediate and senior high schools, the counselors work with pupils of their own sex, and the work is so organized that the counselors have contact with the pupils throughout the three years that they are in school.

In the placement service, the purpose is to provide

placement as the culminating point in the guidance program rather than merely to find positions for young people. The department coöperates in the placement of trainees and graduates of the technical and vocational schools, and it prepares occupational studies for the use of school counselors. All new employers are visited upon the receipt of their first requisition, and thereafter at least once a year.

The department of guidance and placement coöperates with other departments interested in the adjustment of the individual, especially the psychological clinic and the department of attendance.

The Evening School

Although the evening-school program in Detroit is administered by an entirely separate division of the school system, it is vocational in its function. Therefore it should be listed prominently when pointing out the facilities for vocational education.

Cass Technical High School, School of Commerce, and Wilbur Wright are large centers for evening-school classes. The whole evening-school program is strictly for adults. It is the policy to offer instruction in any subject or occupation in which 25 persons register. There is a registration fee of three dollars for each term of twelve weeks. Classes in machine shop and drafting are offered in all schools in which there is equipment. The evening schools operate an "approved" college-preparatory high school. The evening high school gives employed persons the opportunity to complete college requirements. At the present time there are 15,000 adults in attendance in the evening schools.

Vocational Rehabilitation

This is a federal and state service for physically disabled and vocationally handicapped persons over 16 years of age who, it may be expected, will compete in the usual endeavors to earn a living. Established since 1930, the service offers vocational counseling and training, social investigation, orthopedic appliance aids, and placement.

In Detroit there is splendid opportunity for vocational training in our public-school system where disabled persons are given special programs to fit their needs. The high school, technical and trade schools, and the High School of Commerce have contributed greatly to the service of rehabilitation. Local private trade schools have been used to advantage, and apprenticeship work (otherwise known as employment training) has been arranged in many Detroit commercial and industrial establishments.

"The Detroit Rehabilitation and Placement Bureau," located in the Clay School, 453 Stimson Street, plans and supervises all special rehabilitation programs and maintains a placement service for the handicapped, as well as an extensive physical, social, and industrial record of all persons who have been registered for the service.

Sponsored by our local schools and supervised by the State Department of Public Instruction, the Detroit bureau enjoys splendid opportunities in vocational education, in guidance and counseling, and in clinical facilities — both physical and psychological.

The general-shop idea. These pupils are proud to work in a clean orderly auto shop.

Some Features of the Work in Detroit

The General Shop

The term "general shop" applies to equipment and not to a course of study. It signifies a shop equipped for a variety of activities. Most of the shops in the Detroit intermediate schools are general shops with slight differences in their application of the various shop programs.

The ninth-grade general metal shop, for example, has a variety of equipment for teaching the different constructive activities for which metal is used. It provides equipment not only for hand work but for the operation of power machinery. It has equipment for molding and sheet-metal work, forging and heat treatment, and ordinary machine-shop practice.

The household-mechanics general shop, on the other hand, has equipment of unrelated nature to a greater extent than the metal shop. It contains equipment for elementary instruction (grade 7) in woodwork, sheet-metal work, electrical construction, plumbing, and finishing.

Household mechanics is an industrial-arts subject based upon some needs of the household as a source for the activities in the school shop. In this course every boy receives elementary instruction in wood, metal, and electricity, as well as in the repair of furniture, electric fixtures, faucets, bathroom fixtures, and the like. Instruction is so organized that the students lose none of the valuable training formerly given in the old type of manual-training shop, and develop, in addition, many useful abilities of value in the home.

A general shop is also provided in eight academic high schools. This shop has units of equipment for machine-shop practice, electrical work, sheet-metal

Acetylene welding in the George Junior Trade School, Detroit, Michigan.

work, woodwork, soft-metal casting, and for several of the building trades. The course of study offered in this shop has been given the name "industrial mechanics." This is a shop course which has replaced industrial arts, or manual training, in some senior academic high schools. The objective of industrial mechanics is to provide such knowledge (by means of study and shop practice) about manufacturing methods, materials, and industries as will serve as valuable supplementary vocational information to many calling in an industrial community. Trade and technical subjects are taught in specialized shops; that is, shops with equipment for one specific line of work.

In the intermediate schools, classes of the same size are taught in shop and home-economics subjects as in academic subjects. A method by which the students are given the responsibility for the minor duties of organization formerly handled by the teacher has been developed. Each shop has alternating student officers performing the duties of superintendent, foreman, safety engineer, stock clerk, and record clerk.

The shops and home-economics laboratories are equipped in the intermediate schools for 40 pupils, and in the high schools for 35 pupils. The equipment is complete and installed in rooms of adequate size. In all shops in the intermediate schools, as well as in the more recently built high schools, auditorium chairs with tablet arms placed on an elevated platform are provided in each shop for demonstration and study.

Safety Education

A significant feature of the industrial-arts program in Detroit is the new conception of accident prevention. Some years ago accident prevention was stressed with shop instructors for the primary purpose of preventing accidents in the school shop. Although that still remains important, the main objective has now become that of preventing accidents in industry in years to come through proper training in safe practices. Such a program does not involve the absolute avoidance of hazardous work in school shops, but rather training in the safest way of performing many inherently dangerous operations. Thus our students are given training in safe practices by trained teachers instead of being forced later to rely on hit-and-miss instruction in the industrial world.

Training and Changing Technology

Verne C. Fryklund

University of Minnesota, Minneapolis, Minnesota

Much has been heard about the devastating effects of the machine in our industrial work. The study presented herewith shows that the machine is a blessing rather than a curse.

CHIEF among the problems affecting modern industrial workers is the assumption that there is loss of employment through mechanization of work that was formerly performed by hand labor. The population at large, those concerned with administrative positions in industry, and the employees themselves, have been attracted to the possible truth of this assumption. Current literature presents the views of many who would analyze the ills leading to the present depression and these writers are prone to name technological displacement as a contributing or even as a primary factor. In consequence of this assumption of widespread displacement, there follows the belief, encouraged by the uninformed, that there is little need of training for vocational ends in skill or in knowledge because there is less and less need for its use.

The Nature of Technological Displacement

Technological displacement does not necessarily mean loss of employment in the broad sense of the term. It means often that a worker has been displaced from a given job because the work is to be done in another way. Such a worker may find it necessary to seek employment elsewhere; he may be transferred to another job in the same factory; or he may become unemployed. In any event, he has been permanently displaced from his original job. Displacement is a problem common to all agencies seeking improvement

in economic welfare. It becomes, in a sense, a major matter affecting self-support to every individual in the social group. While it is not within the scope of this article to scrutinize all possible causes of displacement of workers, it seems appropriate to offer information that may lead the reader to consider the fact that there may be other factors than technological displacement that may be involved in unemployment and consequently in retraining. Study of displacement may appear, at the outset, as a problem which is not a concern of experts in training; but a period of transition always appears between employment and readjustment to new work. This period offers great possibility for service by those agencies interested in the adjustment and training of workers. Future planning for stabilization of employment must be coöperative and as such, it must be conceived so that it invites coöperation of those agencies that become involved in it sooner or later.

Popular Information Faulty

Available literature assumed to concern displacement would fill volumes. Information gained in preparing this article leads the writer to conclude that much of the popular and semiscientific literature purporting to enlighten the public with respect to the influence of machines on unemployment is based upon casual observation. Most of it is arousing public distrust toward machinery, and consequently toward need of training, in such a way as to hinder progress in planning against unemployment.

The writer had occasion to investigate a "confidential report" on technological displacement with a view to checking its accuracy. Facts upon which the report was assumed to have been based could not be found. A widely known research bureau in marketing, in one of its confidential memorandums, gave out data tending to show widespread displacement in particular industries. Inquiry, addressed to the bureau in question for exact sources, brought the response that the information was secured from an article in a well-known financial daily. The article in question was then secured from the daily, and it was found to have appeared under the name of the education-extension director of one of our great commonwealths. Upon inquiry to him, it was found that the article originally had been a radio address and that publication was not intended; he had no exact sources. A paragraph of this reply is interesting.

> Relative to the article published in the ————————, I may say that this was merely a radio address which happened to be picked up by them and from which they secured three editorials. Most of the evidence given in connection with technological displacement is a matter of common observation. As to the approximation in making of shoes, electric-light bulbs, etc., I am unable to give you the exact sources, since in the preparation of this address it was intended merely as an informal discussion with no thought of its being published.

This confidential statement contained the information that thousands of shoemakers in factories are out of jobs because machinery had displaced them. The impression was given that this change was immediate. The facts on mechanization in the shoe industry, which cover a period of twenty years, are here presented and it shows that unemployment at the present time appears to be due to other causes as well as to mechanization.

Displacement in Boot, Shoe, and Other Industries

A study of 161 representative shoe factories was made in 1930 by the Bureau of Labor Statistics.[1] The data resulting from this study are shown in Table I. The hours of employment and the earnings for a period of twenty years, 1910–1930, are included. The number of establishments increased from 60 to 161; the number of wage earners increased from 10,581 to 55,187; the work hours per week were reduced from 56.5 to 48.9 hours; the earnings per week were increased from $16.07 to $24.94. These data cover a period of intense mechanization and the evidence indicates more work and better working conditions in the industry as a whole.

Oil refining, cement, pottery, and pipe manufacturing also having undergone intensive mechanization and technical changes over a period of years, show substantial increases in employment since 1920 until the present depression.[2] Similar conditions have been revealed in the glass blowing,[3] the automobile,[4] parts, tires, and in the printing[5] industries.

TABLE I

Average Hours and Earnings, with Index Numbers, in the Boot and Shoe Industry, 1910 to 1930

	Years	Establishments	Wage Earners	Average			Index Numbers (1913=100)		
				Full-Time Hours Per Week	Earnings Per Hour	Full-Time Earnings Per Week	Full-Time Hours Per Week	Earnings Per Hour	Full-Time Earnings Per Week
Selected Occupations Only	1910	60	10,581	56.5	$0.286	$16.07	102.7	92.0	94.1
	1911	81	15,088	56.3	.292	16.37	102.4	93.9	95.8
	1912	81	19,405	55.5	.288	15.91	100.9	92.6	93.2
	1913	88	19,911	55.0	.311	17.08	100.0	100.0	100.0
	1914*	91	18,567	54.6	.314	17.11	99.3	101.0	100.2
All Occupations	1914*	91	49,376	54.7	.243	13.26	....	.....	.....
	1916	136	60,692	54.6	.259	14.11	99.1	107.5	106.6
	1918	143	56,321	52.3	.336	17.54	94.9	139.7	132.5
	1920	117	51,247	48.6	.559	26.97	88.2	232.0	203.7
	1922	104	47,361	49.7	.502	24.45	88.4	207.9	184.7
	1924	106	43,460	49.0	.516	25.28	88.9	214.1	190.9
	1926	154	52,697	49.0	.538	26.87	88.9	219.1	195.4
	1928	157	48,658	49.1	.530	26.02	89.2	220.3	196.6
	1930	161	55,187	48.9	.510	24.94	88.6	211.0	188.5

* Two sets of averages are shown for this year: One for selected occupations, and the other for all occupations in the industry. The 1910 to 1914 averages for selected occupations are comparable one year with another as are those for all occupations one year with another from 1914 to 1928.

Availability of Direct Information on Displacement

Despite the preceding information, it is impossible to secure *direct* information regarding the numbers of persons displaced by machinery or by new processes,

[1] *Monthly Labor Review*, U. S. Bureau of Labor Statistics, XXXI, No. 1, July, 1930, pp. 152–159.

[2] Sumner H. Slichter, "Recent Employment Movements," *Survey*, LXII, April, 1929, p. 17.

[3] George E. Barnett, *Machinery and Labor* (Cambridge: Harvard University Press, 1926), pp. 66–71, and Chapter IV.

[4] *Monthly Labor Review*, U. S. Bureau of Labor Statistics, XXXI, No. 1, July, 1930, pp. 40–47.

[5] Elizabeth F. Baker, "Unemployment and Technological Progress in Commercial Printing," *The American Review*, XX, No. 3, September, 1930, pp. 442–466.

even though figures purported to be factual have been offered in various current literature. While estimations may be made on a few factories, the data would not be sufficiently exact for a scientific report. Lack of factory records showing the number of men displaced precludes the possibility of securing data. Where changes have been made in managerial personnel, information gained from foremen or plant managers would be merely estimated. Some data were secured on very recent machines, most of which were installed to produce new devices and accessories previously unknown but now necessary to human needs. If it were possible to secure a record of the influence of these particular machines on labor, it would show the benefit of machinery to labor to be greater in this instance than the liability of the displacement of men. Investigations would reveal that these machines made work for men rather than displaced men from work.

Another reason for the difficulty of securing direct data on displacement is that scarcely an article today is the exact counterpart of that produced ten, fifteen, or twenty years ago. Articles produced today are superior to those formerly produced. Wood is displaced by metal; rubber is now of superior quality; alloys make possible less costly substitutions; and so on. New devices and changing products require new machines that cannot be regarded as displacing to labor. Failure of attempts to secure exact data on technological displacement suggest a need for cumulative records for continuous research on employment and training problems.

Overlapping and Varied Causes

A recent study published by the National Industrial Conference board (Inc.)[6] has made available information secured from 248 companies that employ three quarters of a million wage earners. Data in Table II were reported and compiled for 136 of these companies during the depression of 1927. Figure 1 shows

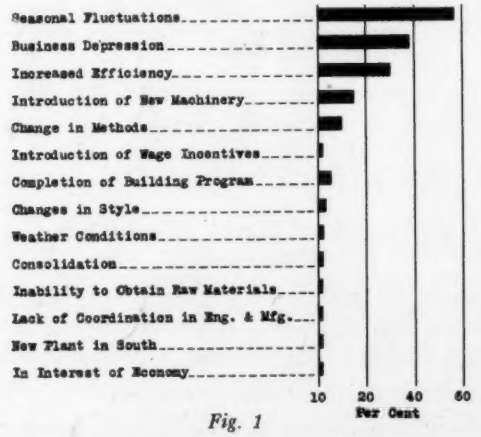


Fig. 1

this information in a more interesting way. While each bar is based upon 100 per cent as representing the 136 industries, the total percentages become larger than 100 in their aggregate. This is due to the overlapping of causes reported which could not be eliminated when compiling the data. It is interesting to note that 15.4 per cent of the total lay-offs were due to the *introduction of new machinery*. *Seasonal fluctuations* (55.9 per cent), and *business depression* (35.5 per cent), according to this data, were the real causal factors of unemployment during that year.

TABLE II

Reasons Reported by 136 Companies for Lay-offs in 1927

Reasons	Per Cent of Companies
Seasonal fluctuations	55.9
Business depression	37.5
Increased efficiency	28.7
Introduction of new machinery	15.4
Change in methods	11.0
Introduction of wage incentives	2.2
Completion of building program	4.4
Changes in style	2.2
Weather conditions	1.5
Consolidation	1.5
Inability to obtain raw materials	.7
Lack of coordination between engineering and manufacturing departments	.7
New plant in South	.7
In interest of economy	.7

Information regarding unemployment was gained from interviews with 1,558 unemployed men and women in Minneapolis and Saint Paul during 1931–32.[7] Examination of Table III shows that only 1.8 per cent of the total lay-offs in this area were due to a combination of *new machinery* and other *technological changes*. Table III shows further that 56.1 per cent lost their jobs as a result of *business depression*, and 36.5 per cent as a result of *personal factors;* other causes were negligible.

TABLE III

Reasons for Unemployment—1558 Cases Unemployed in Twin Cities

Reasons	No.	Per Cent
Business depression; slack business	874	56.1
New machines, processes, and management; technological	28	1.8
Seasonal work	35	2.2
Business reorganization	50	3.2
Personal; physical disability, age, lack of experience or training	571	36.6
Total	1558	99.9

It is important to know that there are other factors, as well as technological changes, that force unemployment and subsequent retraining and readjustment; and should be taken into account by the various coöperating agencies in planning for stabilization.

Increasing Attention to Training and Selection

Despite the fact that much popular information on displacement is misleading, as may be implied from the data here reported, training and correlated activities are being given high consideration in planning for improvement. Industrial personnel departments are giving more thought than ever before to selection and training of workers. The determination, organization, presentation of content, evaluation of methods, measurement of results, and the training of instructor-foremen are leading activities in personnel depart-

[6] *Monthly Labor Review*, U. S. Bureau of Labor Statistics, XXXI, No. 3, September, 1930, p. 571.

[7] Employment Stabilization Research Institute, University of Minnesota, Minneapolis, Minn.

ments of many companies. Training has been and will continue to be given to all groups from the unskilled up to the executive staff. The thoughts and attitudes of new employees, as well as old ones, toward the company aims, standards, and policies become enthusiastic in these organizations as a result of this training. Training develops morale and it is a consequence of good psychology.

The functions of personnel departments should be broad in scope; their usefulness does not cease with hiring and firing. Both social and economic services can be performed by helping workers to equip themselves better for useful tasks. The personnel departments also should extend their functions to the guidance of workers as well as to training. And, too, the psychology of the person in action should be given consideration.

Industry is giving even more consideration to the contribution of psychology than many educators in their own fields. The psychology of learning, of habit formation, of development of interest, and of individual differences is so sound and so certain of function, irrespective of groups or individuals, that training work leading to better intellectual, motor, and emotional attitudes in any organization cannot succeed without it. Many varied accounts have been set forth of men in industry, but none of these has been as much worth while in personnel work and in training as efforts to understand the behavior of human beings in their work situations.

Summary and Implications

Extended data might be sought on the changing conditions in industry, but it is doubtful if new kinds of data would be found that would lead to new considerations of the problem. We know that (1) new machines are appearing rapidly, but it does not necessarily indicate that men have been displaced by each new machine; (2) measuring exactly displacement of labor, and the placing of responsibility for unemployment upon machines are difficult tasks, because no factual information is available at the present time indicating the numbers displaced; the indications are that there is some displacement and that new work is created at the same time. (3) There is considerable indication in normal times of *displacement* and *reabsorption* of workers within industries, due to technological change and management and new commodities appearing on the market. (4) In consequence of these changes man need not expect to become trained permanently in any occupation that he may enter in this changing era of mass production; he should expect to be ready to readjust and to keep himself versatile. Workers who cannot adjust themselves to changing conditions will be unfortunate in attempting to match their abilities with scientific progress. Occupations seem no longer to be lifetime occupations. There appears more than ever before need for training activities in consequence of technological change.

We are not relieved of the individual problems in displacement and retraining. There is frequently a period of delay, idleness during readjustment or retraining, enforced change of environment, and much suffering and worry; all this accompanies progress. Many things are produced now that were never produced before, and machines have made them possible; we cannot turn back and be satisfied with the commonplace. All this lays upon society a serious obligation and it should not become entirely the burden of the workers.

It was not the purpose of this article to determine all causes or to offer conclusive plans for relief or unemployment. The economists and engineers in their researches undoubtedly will have many interesting things of value to divulge and suggestions which, if followed, will greatly assist in enabling us to avoid another calamity such as that of the present and of the immediate past. The problem is not singular, however, and many agencies must coöperate in planning improvement, for there will be inevitable continuance of scientific methods in industry. The human element must be reckoned in the planning, however exacting it may be. Personnel will always be a factor and, while individuals are all different, they are essentially alike in that they work from morning until night and from birth until death according to certain inevitable human and psychological laws which machines or management cannot set aside. Whatever is done in attacking the problem by any agency, the minds of men cannot be altered. The study of human behavior and training will necessarily serve as a point of departure if ultimate success is to be gained.

Transparency made by students in the architectural course at the Tilden Technical High School, Chicago, Illinois. Mr. A. N. Lurie, instructor.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

Attend Your Educational Conventions

The coming A.V.A. convention at Detroit has for its theme "Vocational Education for Relief and Reconstruction." This theme contains a great deal of important material for every teacher of industrial-arts and vocational education. This year's convention is of great importance and should necessarily be attended in whole or in part by every teacher, supervisor, principal, director, and superintendent who can possibly leave his work.

There has never been a time when it was more necessary for those interested in industrial-arts and vocational education to act as a unit. The hand of distress has lain so heavily upon the land that the vision of the best has become impaired when the question of reducing expenditures for public expenditures needs scrutiny. As a result, education has suffered greatly, especially that phase which deals with industrial-arts and vocational work.

Some localities have succeeded in successfully coping with this tendency to reduce ruthlessly the educational budgets; others, less efficient, have suffered severely. It is necessary that we learn from the successful ones just how they accomplish their difficult task.

Throughout our country there are many young people who ought, by the standards handed down to us from the past, be starting out at earning their own livelihood. With conditions as they are, there is little or no likelihood that they can secure employment. Yet many localities are doing nothing about the problem brought about by this condition of affairs. It is necessary for shop teachers to learn how some cities are successfully handling this problem if the youth of this country is not to be seriously harmed.

The retraining of technologically unemployed has received much thought in some quarters, while other city school systems have done little or nothing with this vitally necessary phase of adult education. It is time that the country as a whole attack this problem lest the fabric of our civilization be permanently weakened.

Increased leisure for the workingman is no longer a phantasy. It is here even for those who are employed. The majority of mankind seemingly cannot adapt itself to a changed condition unless shown just how the new situation is to be met. Commercialized entertainment is obviously not the correct solution of what to do with the newly acquired leisure, even for those who have the money to pay for it. Industrial-arts work has much to offer in the solution of this new problem. At the A.V.A. convention, as well as at the state conventions, much attention is devoted to the question how the school can best adapt its work to take care of this responsibility.

Of course, only those who attend the convention can profit by the formal and informal discussions held. It is, therefore, plainly the duty of everyone who can possibly attend to do so. Only by taking counsel together can those interested in industrial-arts and vocational education formulate effective plans to take care of the work that confronts them, and only by a united stand can the country be converted from the now prevalent idea that industrial-arts and vocational education is a phase of education that can be readily dispensed with.

A Sign of the Times

History shows that oppressions, persecutions, and restrictions have at all times consolidated and strengthened the worth while in the group that was being tyrannized.

The school is just now going through a period of travail which bids fair to do more than cripple education. Yet out of the seeming irreparable damage that is being done to the cause by fear-stricken, short-sighted, and even dishonest and selfish men cloaked with political power, the signs of the times in the educational field show much that is extremely heartening.

Educational groups are becoming more unified. They have rediscovered the extreme value of coöperative thinking and counseling. No longer is the individual satisfied to be a lone wolf, depending upon his own wisdom and experience. The "I-know-it-all" attitude is slowly disappearing, and in its place is growing up a much more wholesome disposition to listen to what someone else has to propose and to act with the group rather than individually. Educators are learning the value of the united front. The outcome of modern battles no longer depends on the victory of a single champion, but rather upon the united and unified action of men in mass formation.

That the shop teachers, too, are attempting to solve their problems in this way is evident to anyone who has the opportunity to attend state conventions of industrial-arts and of vocational teachers. This has been going on for the past several years, and the momentum it has received can be discerned in ever widening circles.

The labors of the research committees of the Michigan Industrial Education Society, the curriculum work done by regional groups belonging to the Industrial Arts Association of Wisconsin, the splendid programs carried on by the vocational associations of Indiana and Illinois, all show that shop teachers in general are strenuously engaged, even in times when their teaching load has been increased and salaries often lamentably decreased, to improve themselves professionally and to make their work with their pupils more helpful and effective.

Probably the latest organization of this kind was created Saturday afternoon, November 4, when the drafting teachers assembled at a sectional meeting dur-

ing the Illinois Vocational Association convention at Chicago, organized the Illinois Drafting Research Group. As their chairman, they chose H. D. Campbell, of the J. Sterling Morton High School, Cicero, Illinois. This action came at the end of a sectional meeting of drafting instructors which had already lasted till four o'clock on a Saturday afternoon. Some of those present had been teaching for many years. Some had not received their salaries for months, yet they possessed enough professional and civic spirit to assume more work, give more of their enthusiasm, time, and energy in order to learn how to do a better job, in the face of the deal meted out to education in Chicago.

Such professional spirit is the best kind of rebuke to give to those politicians who unhesitatingly rob the youth of America of the education to which they are entitled. It is a hopeful sign that these men think of improving their work instead of giving way to discouragement, or of matching a reduced salary with a lessened effort to do a good job.

An Opportunity

The Playground Association of Philadelphia, during its 1932 Christmas Toy Shower, reconditioned and delivered over 50,000 toys. These "good-as-new" playthings were turned over to 132 child-caring agencies, such as day nurseries, settlement houses, and recreation centers, who in turn saw to it that the toys were distributed among the needy children of Philadelphia.

To take care of this gigantic task, the Playground Association had interested men and women in collecting, not only the toys, but also the wherewithal to make the repairs. Donations of paints, enamels, brushes, tools, lumber for shelving and tables, waste rags, cleansers, disinfectants, wrapping paper, remnants of different kinds of cloths and silks had to be obtained. Sewing machines were borrowed, and large numbers of volunteer men and women were interested in donating part of their leisure to help in this charitable work.

Publicity for the work was secured through a local newspaper, and thousands of children were made happy on Christmas Day because of the unselfishness of those who helped with the work.

The repairing of toys in the school shop is not a new idea at all. Nevertheless, there is not enough of it done. It is a Herculean job to set a piece of work like this in motion; nevertheless, it is so thoroughly worth while in every way that the labor of starting and carrying it along ought not to be looked upon as insurmountable. The fine spirit of charity, and the wish to help those in need, inculcated by this work, is sufficient argument for instituting this particular endeavor in the routine of the school year. Of course, the time in the school shop during the day may be all too short to accomplish much of the work, yet the really interested teacher can get his students sufficiently aroused to put in extra time after school hours and on Saturdays to make the volume of work appear more than astonishingly large. It will require a great deal of planning, enthusiasm, and energy on the teacher's part, but he will be well repaid by the personal satisfaction of knowing that thousands of children will be made happy by what his shop has produced. He will also derive a great deal of benefit in his own classwork from the willingness to do for others, and to work with others toward a common goal, that this work engenders in his students.

Another much desired outcome of this work is the favorable publicity which it gives to the work of the industrial-arts department in the schools. Unfortunately, few people seem to take much interest in what is happening in the school until times such as the present suddenly make it appear that the schools are veritable Molochs which allegedly devour stupendous sums of money for which there is no adequate return. Of course, it may look rather mercenary to institute a work of mercy for the sake of the good one can get out of it. Nevertheless, it makes the charitable work no less desirable because as a by-product some modicum of good results for oneself.

To make the work really successful, it has to be started shortly after Christmas and carried throughout the year in order to have enough toys on hand for the next Christmas. The entire school system ought to participate. Every child should be exhorted to bring one or more toys to schools. Likewise, the children can be appealed to for much of the material required in the rejuvenation and repair of the toys. In this way the school will have to incur little or no expense. Other school departments ought also to be called in to assist with the work. For instance, the doll dresses can be sewed by the girls taking home-economics work at the school. The painting and color work can be taken care of in the art department, while the repair, storage, and delivery of the finished work may be assumed as part of the duty of the industrial-arts department.

While it may be too late to start this work for the coming Christmas season at this time, nevertheless it is not too early to start for the Christmas season of 1934.

A Question of Design

The criticism is frequently heard that the design of projects made in industrial-arts shops is, on the whole, exceedingly poor. Industrial-arts teachers themselves admit this, although no one is quite willing to acknowledge that his individual designs are poor. Probably the severest critics of the school shopwork are the art teachers. No doubt these would be quite willing to coöperate with the industrial-arts department by criticizing and refining designs of the projects chosen by the shop teacher. It is strange that so little of this coöperative work is done, yet it is worth while for any school to coördinate the work of its several departments, and industrial-arts teachers should not overlook the extreme value of this working together toward a common end. If the scheme of coördination is properly worked out there will be no interference with the work of either department, but the designs produced in the school shop, it is to be hoped, will be so improved that the entire school will be proud of its shopwork.

Industrial Arts and Leisure

Emerson Wm. Manzer

Bronxville, New York

Without referring to present conditions, the worker of the future most certainly will have more leisure than he was accustomed to in the past. The author shows how the industrial-arts department in the schools can broaden its scope by offering opportunity for the wise use of this leisure.

THE schools, although they have been under criticism for a quarter of a century, have never before been subjected to a more intelligent scrutiny than they are today. In almost every village, town, or city, there are critics who speak of the "frills and fads" of modern education, and unfortunately, they refer to the industrial-arts subjects in most cases. They fail to recognize the importance of the industrial arts in a mechanical and scientific age simply because they did not have those important subjects when they went to school. They fail to recognize that education results from a sum total of all our experiences and that most of the experiences gained through industrial-arts activities will be more useful in later years than the algebra, Latin, and solid geometry that is so often taught and considered an essential of education.

In order for the supporters of the industrial arts to nullify these erroneous thoughts and expressions, it seems advisable that advantage be taken of every opportunity to create a new and modern impression of the values of industrial or practical-arts subjects.

The present time seems to afford an ideal opportunity for instructors of the industrial arts to show that their subjects are of vital importance in modern education and as a basis for the training for leisure-time activity.

This can be done quite effectively through several avenues of approach. First, through the integration of industrial-arts subjects with the so-called required subjects; second, through the use of industrial subjects as leisure-time activities for the students; third, through the leisure-time activities of the adult.

Integration of Subjects

The integration of the industrial arts with other subjects offers a rare opportunity to make this type of work more effective and more permanent. It enables the shop teacher to give other teachers an opportunity to motivate their work through student-made projects, and it enables the industrial-arts department to give more students an opportunity to come in contact with the school shops. The student not only gets some work to do during his leisure time, but also has the opportunity to build up an intelligent understanding of the value of the industrial arts. If students and teachers become more dependent upon the school shops, it will be harder for them to class the industrial arts as "frills and fads."

Effective integration calls for a definite time set apart for the use of all shops, art rooms, library, and classrooms. It means that students must have a work day during which they may schedule time in shops or rooms where they can do special work related to some specific subject or use some of the time to advance in subjects in which they find difficulty. They may elect to work a period or two on one subject and spend the balance of the day on a related project. This work day will necessitate certain administrative regulations, but this may prove to be a very minor problem.

Now, what type of activities can be taken up by students who are enrolled in other subjects, as, for instance, the social studies? To vitalize this subject, a class studying the Colonial period could make models depicting the industrial activities of that period. A frame for weaving, a spinning wheel, or a reproduction of some utensil used in the home, may be made. Or pictures may be collected that are to be posted on the bulletin board, or a list of important men and women and the type of work they did during their time may be made. Many other suggestions will come from the interests of the students themselves. Several boys recently came to the woodshop to make a model of Fort Dearborn with its wooden barricade. Some have made a study of Colonial craftsmen and supplemented this with a collection of pictures showing the type of ware they manufactured.

In physics it is possible for several boys to make a large magnet similar to those used to load and unload scrap iron at the blast furnaces. A clay model made in the art department can be cast in metal in the general shop. A model of a steam turbine will effectively show the principle of the modern turbine. A chemistry class can use a cross section of a model blast furnace, showing how the furnace is charged with iron ore, coke, and limestone. This, supplemented with pictures and samples of iron and steel, will prove a great aid in teaching this work to students. A model of a Roman house for Latin, puppets for the dramatics class or the art department, and even projects that can be used in the study of mathematics, will call for the use of shop equipment. The interest of the student will cause him to use some of his leisure time to make these projects so that they can be put to work in their classrooms as soon as possible.

Of course, there will have to be some intelligent reading done so that the projects will be made according to the directions given, and so they will prove of

use to the class. Much education will come from this method of research, and if other departments will coöperate, the findings will make valuable material for English compositions.

By using this type of material for compositions whenever it is possible, the student will develop that ease and accuracy in the practical use of English which is so valuable in life. Many boys with a technical slant would derive much more benefit from their English work if they were allowed to give oral talks or written papers on subjects in which they are vitally interested.

Leisure Time of Student

The second avenue of approach to the subject of industrial arts is its use as a leisure-time activity by the student. It must be kept in mind that there are several kinds of this leisure; for instance, the week-end, the after-school leisure, and the vacation-time leisure. The school can be of service to him in each case.

In the past, too much emphasis has been given to the project and not enough to vital educational material. It is true that the student enters industrial-arts courses because he can make something of value, but from the standpoint of giving the boys some real industrial information, there is frequently much lacking. Of course, there are places where an excellent piece of instructional work is done. Unfortunately, however, the number of these places is rather limited.

If industrial-arts work is to get wholesome recognition as an integral part of the general educational program, it is quite imperative that the industrial-arts courses be revised so that the project emphasis will be somewhat softened. This revision offers an opportunity to provide something for the student to do during his leisure at home. This does not mean that he will be given regular homework, but his interest can be aroused in some particular type of work which will occupy a part of his extra time. The following suggestions may show how this may be done.

The general shop is a rather common type of industrial-arts shop. The objective of this shop is industrial education through participation, observation, and investigation. By participation the student will be able to do a number of projects or jobs. They may be of his own choice or suggested by the instructor. This will provide an interest that will, in many cases, carry over to his leisure time after school. His observation may be stimulated by excursions or by the showing of industrial films. For instance, imagine a class that has seen the film on "The Story of Steel." To create an interest in this story of steel, have two or three boys locate on a large map of the United States where iron ore mines are located. Colored pins and legends may be used for this. Then the method of transporting the ore to the blast-furnace areas may be shown by cutting out pictures of ore boats and placing them on the map in the routes used for transportation. Several other boys or girls may be asked to locate the manufacturing centers where the steel is used. Then charts showing pictures of manufactured materials made from steel may be made. These usually arouse quite a bit of interest. Boys, who are gifted in art may be asked to collect a series of pictures that will show how art in industry is dependent upon steel or iron. Much of this material may be found in the magazines. Charts, upon which these exhibits are mounted, may be taken to other classes where oral reports are made. This same method may be extended to every visual aid that is used in the class. Pictures and descriptions of the numerous inventions that made America the industrial and agricultural country that it is, are also of value.

Investigations of an industrial character will prove to be valuable educational material. Let several boys from the social-science classes study the automobile industry. Let them get facts about the materials used, the total value of the industry, the various types of jobs and positions that are involved. All of this material can be found during leisure time. Several weeks may be spent on this study. Letters, written in the English class, may be sent to the National Automobile Chamber of Commerce and to automobile manufacturing companies for educational data.

Another interesting bit of industrial investigation would be to list all of the industries in order of their importance or in order of their employing power. How many men does the automotive industry employ? How many men does agriculture employ? How many men and women do the textile industries employ? And so on, down the line of American industries.

The whole school or individual classes could study and list the many professions, trades, and technical positions, and other occupations that are in existence, and perhaps also, something of the wages paid in the various positions could be obtained. The students could also determine what educational preparation is necessary to enter the professions or technical positions which they have listed. An analysis could be made of a large industrial plant, or a large department store showing the various departments, the various positions, top and bottom, that are embraced by such an undertaking. Much assistance could be given by parents. Does this mean that the student will have to do all of his work during leisure time? If the industrial-arts courses are to be vitalized, the student must spend some of his time in a classroom just as any other class does that has laboratory work. But more emphasis must be given to subject matter and related information. It is possible to break down the traditional shopwork so that some time may be given to educational material. The boys may raise a cry because some of their shop time has been taken away, but after all these boys must be taught, not merely catered to. By developing their interest in this kind of industrial-arts work, it will be possible to give the student plenty to do during his leisure hours. Much of this material collected or made also may be shown

at the annual school exhibit. In this way the taxpayers and parents of a community can get a better idea of the value of the work than they get from looking at a long line of projects that do not tell the real story of industrial-arts work.

Leisure Time of Vacation

In many places, vacation leisure is taken care of through recreational centers, but what about the boys and girls who are not fortunate enough to have this advantage. For these the school shop can do much to help them help themselves. The Life Science teacher of the Bronxville Elementary School, Miss Anna Greve, has an excellent plan for getting her pupils to do some kind of work during their vacation. It is very interesting to see the diversified collections that are brought to school for the fall exhibit. Collections of insects, bugs, butterflies, minerals, old bird nests, photographs made during summer, articles that have been made at home, and numerous other items that only boys or girls can think of, are brought to her classes.

Shop teachers can profit by her experience. They, too, can make suggestions for summer work, lend blue prints, make up lists of reference books, show how to get materials, and if need be, help gather materials with which the boys can make articles. Some local club may be induced to sponsor a kite tournament, or to give prizes for work done during leisure time. Merchants usually are willing, if approached in the right way, to give wooden boxes to the school for the boys to use, and also to grant window space for the exhibit in the fall.

The shop teacher can send a list of suggestions home to the parents telling them that it is desirable to have the boys do something worth while about the home during vacation time. Painting chairs, porches, repairing light cords or flat-iron cords, cleaning cellars, mowing grass, making homes for birds, repairs of various kinds using wood or metal, and a host of other ideas may be embodied in these suggestions. The students may be required to return this list in the fall, and recognition should be given to those who made a good job of what they had chosen to do.

Many other suggestions could probably be obtained by having a conference with a group of industrial-arts instructors. The ones here given are just a few to illustrate the idea.

Leisure Time of Adult

During these trying times, involuntary leisure has been thrust upon thousands of adults, and the industrial-arts shops can play a very important part in keeping up the morale of these men if the instructors will take advantage of this opportunity for serving their community. Shops opened but one night a week with free service, so that men and women can come in to satisfy their desire to do something worth while, will do much in placing industrial arts in a position where it will have greater security from those who call it one of the "frills and fads." In one community, where this was done, forty women enrolled to do work in a metal-craft shop. The other shops in this school were also opened, the gymnasium, classrooms, home-economics rooms, science laboratories, in fact, every teacher in that school gave one evening a week so that members of the community might take advantage of an opportunity to do work in their leisure time. In this way the school became the recreational center of the community.

It is needless to state that the industrial department of that school has won many ardent supporters. A speaker, before a Westchester audience gave some very enlightening thoughts on this very subject. He said, "Given leisure, man will do one of three things: Sleep, not necessarily in bed, but mentally while listening to the radio or attending the motion pictures, club meetings, or while playing bridge; carry on antisocial activities, and probably commit crime; or devote himself to appreciation of creative arts in every line of human endeavor — music, drama, athletics, science, games."

He further brought out the point that we are becoming adept in the first two of these leisure alternatives, and history reveals that no civilization which gave itself up to this sort of leisure ever survived. America's hope lies in the last alternative and it is this that recreation programs are stressing most. Playgrounds and recreation centers are striving to build hobbies which will live through all the years, and which will save individuals from the boredom brought on by the unintelligent use of leisure. Idleness and improper use of leisure only leads to the degeneration of the personality.

L. P. Jacks, the noted English educator, strongly substantiates this idea when he says, "Perfect health of the body demands, when all other demands have been satisfied, that opportunity shall be found and training given for the exercise of creative activity. Short of this, the perfection of the body is not attainable. The exercise it demands is essentially skillful exercise — an unskilled body is a thwarted body — and because thwarted, unhealthy — for the individual, health and happiness are unattainable so long as his natural skill-hunger remains unsatisfied.

"Dull and drab at the best is the life of the man or woman incapable of creative activity. That man desires happiness and can never be diverted from the pursuit of it is true, but the happiness he desires is not of the kind that ready-made pleasure can supply, or money purchase. It is the joy of creative activity which the whole structure of his mind and body, evolved through long ages of struggle with nature, designs him to exercise."

It is this creative activity which the industrial arts in education can offer to adult members of our respective communities. The industrial-arts teacher cannot afford to let this opportunity go by. The growing desire for business men or working men to satisfy "skill-

hunger" is perhaps the basic reason for the perfectly astounding increase in interest people are taking in all forms of hobbies that are related to industrial-arts subjects. This increase in interest in manipulative activity is shown by the number of advertisements for small tools that almost every magazine carries. Magazines such as *Popular Homecraft, Package Magazine, The Home Craftsman, Handy Man's Manual* are concrete evidence of a growing desire for information on the part of those who, at the end of the day, feel a sort of vague unsatisfied "skill-hunger."

A community which believes that its duty lies in producing healthy, happy, contented citizens cannot fail to coöperate with the industrial-arts department of their school system in providing opportunities for creative activity. The school shop should be the first to take steps toward the solution of the adult leisure problem by providing opportunities for those who enjoy and appreciate the creative arts in every line of human endeavor. If this is done, the school will quickly become the recreational center for the community. The old saying "Satan provides work for idle hands to do," is still true, and it is equally true that his work is of a destructive character.

It is up to the industrial-arts department then, to answer the challenge that this crisis has brought to its very doors. There is no time to lose, emergencies call for immediate action.

Making the School Shop Safe

Curtis Billings

Secretary, School Shop Committee,
National Safety Council, Chicago, Illinois

How to make the school shop safe must be of vital concern to every shop instructor. Mr. Billings, in his article, makes some very pertinent suggestions.

WITH leading American industrial concerns, even in these lean years, expending millions of dollars annually to prevent accidents in their plants and on their properties, it is not surprising that the subject of safety and the task of instilling safe habits of work in students are becoming considerations of more and more importance to the vocational and trade schools of the land. Safety has been accepted as a synonym for efficiency; the words in the minds of forward-looking employers of labor are almost interchangeable. Consequently, in these days when the supply of labor exceeds many times the demand, the man who is trained to work in a manner that promotes his own safety and the safety of his fellow workers has the advantage. He is more efficient and he is by far the better compensation risk.

The vocational and trade school prepares young men to take their places in industry. It is logical, therefore, that schools are anxious to make sure that each one of their graduates is imbued with a proper attitude toward accident prevention, and that he knows how to handle his tools in such a way that neither he nor others will get hurt. The industrial waste caused by accidents each year in the United States amounts to an almost incredible figure. Waste on the part of an industry, a plant, a department, or a man is not condoned in a day when the rallying cry is economy.

The first purpose of the school, therefore, in teaching a man safety is to prepare him adequately for industry. He is not so prepared for the modern industry if he does not know safety. The second purpose is to prevent accidents which occur in the school shop itself. Let no vocational-school director or instructor shrug his shoulders and say, "Accidents simply do not occur in my shop." The fact is that accidents occur wherever men and machines get together; the vocational-school teacher who says they don't, usually confesses then and there that he has no idea of what accidents do occur in his shop and that he has no adequate system of keeping records of accidents. The same answer is encountered time and time again in talking about safety to the operator of the small industrial plant. He is likely to insist: "We don't have any accidents." But statistics year in and year out demonstrate that the small shop where safety is not recognized, or, more properly, where accidents are not admitted, is many times more hazardous a place to work than the large plant where the cost of accidents is known and efforts are made to prevent them.

The indifference of too many vocational-school instructors and directors has been lamented before now. Mr. Harry D. Immel, Director of the Bureau of Inspection of the Pennsylvania Department of Labor and Industry, made the following pertinent comments in an address a few years ago:

> I have seen instructors to whom safety did not seem to mean enough to indicate that they would have much success in teaching it, to say the least. I recall a visit I made to one school. The buzz of a circular saw led me to the basement workshop where I found a pupil using a saw without a guard. Inquiry brought from the instructor a rather irritated admission that there was a guard somewhere. After a search it was found behind a door. The instructor said it was a nuisance.
>
> Let teachers be frank with themselves in this important matter. If I were a teacher, it would be a great help to me to know just how the world outside the schoolroom viewed the thing that I was teaching. The greater the value placed upon it, the greater would be my inspiration to teach it well. For that reason, I should deal with the recognized importance of industrial safety. Fortunate indeed is that vocational

teacher who comes to his position after an apprenticeship in one of those splendid industrial establishments in which safety is almost a religion. Such a teacher will turn out pupils who will be not only good workmen but also good compensation insurance risks.

Mr. Immel went on to say that in 1928 fifteen million dollars were paid in Pennsylvania in compensation insurance for industrial accidents. Since it is estimated that compensation represents only one fifth of the total cost of the industrial accidents, the sum of seventy-five million dollars was needlessly diverted from pay envelopes and profits in that state that year.

Is it not significant that every study made of vocational-school safety show that there are plenty of accidents upon which the study may be based? Dr. Max S. Henig, who a decade ago made a study of accidents in the Essex County, New Jersey, Vocational School for the National Bureau of Casualty and Surety Underwriters, found that no less than 208 reportable accidents occurred between September of 1919 and June of 1922. This was, incidentally, a good rather than a bad record; for during those years a complete safety program was developed and put into operation. The record appears all the better when it is considered that for the purposes of his study Dr. Henig counted every mishap that resulted in any injury that required treatment, and every injury that presented the possibility of infection received treatment and thus was counted. Even the merest cut was included.

The following table shows the accidents used by Dr. Henig in his study:

NUMBER OF ACCIDENTS BY CAUSE
September, 1919, to June, 1922

Causes	Departments					
	Auto Repair	*Carpentry*	*Drafting*	*Electrical*	*Machine*	*Total*
Hand tools	17	33	0	14	8	72
Machines	0	20	0	3	13	36
Handling material	14	8	0	2	7	31
Scuffling, horseplay, etc.	3	4	2	3	2	14
Struck objects	0	10	0	3	0	13
Burns	0	0	0	5	2	7
Handling chips	0	0	0	0	6	6
Struck by material	0	2	0	0	2	4
Cranking motor	4	0	0	0	0	4
Falls	0	2	0	0	0	2
Miscellaneous	9	2	3	2	3	19
	47	81	5	32	43	208

Last year a survey of vocational-school accidents was completed by Mr. Wayne M. Judy at Iowa State College, which was described in the September, 1933, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. His study attempted to cover all of the industrial-arts shops in the state with the exception of those located in towns of less than 400 population. No one can review the statistics he gathered without being impressed by the very magnitude of the accident problem. In 16 months 726 accidents occurred in 249 shops of the Iowa school system. Of these, 113 required a physician's ministrations, 18 resulted in the amputation of some part of the body, and 6 caused the loss of one or both eyes! Verily, accidents do occur in school shops — serious accidents, and lots of them.

According to this study, hand tools, which are not considered so dangerous but which are used a great deal, caused 557 injuries, while power-driven machines caused only 156. Three hundred and twenty-three accidents were listed as caused by "pupil carelessness," and only one was caused by "lack of instruction."

Mr. Judy's conclusions are seconded by Mr. Carl E. Karlstrom, assistant supervisor of vocational education of the Detroit public schools, member of the School Shop and Laboratory Committee of the National Safety Council, to whom the report was shown.

"I am inclined to believe," Mr. Karlstrom said, "that these figures would be a better representation of the facts if they were reversed to read that 323 accidents were caused by lack of proper instruction and that one was caused by pupil carelessness. Experience has shown in many instances that the pupil's carelessness was the direct result of lack of sufficient instruction. Just because a pupil has been told a thing once, it does not follow that he has been given sufficient instruction. Accidents simply indicate that the instruction was not impressive enough. In Detroit no accident report lists the cause of 'pupil carelessness.'"

Mr. Judy added several other conclusions that are to the point. Safety education must be directed especially toward the use of wood chisels, hand saws, knives, planes, and hammers among hand tools, and to jointers, table saws, and band saws among machine tools. He repeated that instructors of the state are not taking their share of the responsibility in the problem of accident prevention and that a more thorough system of safety inspection is badly needed.

A recent report issued by Gordon C. Graham, Safety Engineer of the Detroit Public Schools (he is, incidentally, chairman of the School Shop Committee of the National Safety Council) showed that 102 accidents occurred in the vocational shops of that city during the school year 1932–33. They resulted in the loss of 115.5 days from school. And bear in mind that the Detroit schools have as complete and as effective a program for safety as any school system in the United States. Two of these accidents were fractures, one of the jaw, the other of the wrist. One boy swallowed a one-inch brad. There were 18 lacerations of the face, body, and hands, and 21 contusions of greater or less severity.

From the foregoing it is seen that school shops do have problems of accident prevention which must be solved, not only for the purpose of sparing the student from injury while he is in school, but to protect him later when he is employed in an industrial plant.

Now, how should the vocational school go about this all-important task of preventing accidents and inculcating a proper regard for safety in the minds of

the students? Different plans have been advanced and put into successful operation, and it must be said that any method is a great deal better than no method at all.

The first requirement is to maintain an accurate record of all accidents that do occur, with enough details given so that the causes of the accidents may be discovered and eliminated. Records inform the instructors of the types of hazards most prevalent, and show clearly where emphasis in safety education must be placed. In some schools complete safety organizations have been formed modeled after the organizations in industry, and Dr. Henig recommends that safety be taught not only in the shop itself but in the academic courses as well.

Only the simplest type of vocational-school accident-prevention program will be mentioned here. It might be called the minimum requirement. This program would consist, first, of keeping complete records of all accidents, and second, it would include the appointment of a student safety engineer in each shop class, who would serve for one week, the position being rotated so that every student would become experienced. Because not only his responsibilities but also his powers would be manifold, the safety engineer would occupy a place of dignity in the class organization. He would check for safety, all tools and equipment, including power-driven tools. He would enforce the use of protective devices, such as guards and goggles, and insist on proper housekeeping. He would prevent scuffling and "horseplay," and see that all machine operators have their sleeves rolled up above their elbows. He would make sure that the lighting and ventilation were adequate, and be in charge of the safety display or bulletin board where posters and news items would be shown. He would also report all cases of injury, however slight, to the instructor who would render first aid. The student safety engineer would also be required to make a complete written report to the instructor of every accident.

These duties of the engineer would be largely determined by the accident experience of the shop. *Emphasis would be placed on the types of accidents the records show are most likely to occur.*

The duties of the safety engineer in the school shop with the average accident experience have been outlined in the list shown herewith.[1]

These are the first steps recommended by the school-shop committee of the National Safety Council in starting a safety program in the vocational school. A great deal more can be done and is done in some places, and complete information as to the methods to be employed, is available; but if the average school at the present time were only to recognize the need for safety education, keep a record of all accidents which do occur, and appoint a safety engineer in each class, and rotate this position so that every boy would have an opportunity to serve, the number of accidents in American vocational schools would be materially reduced and the graduates of the schools would be better trained to take their places in industry.

Duties of the Safety Engineer

1. See that all neckties are removed or tucked in.
2. See that sleeves are rolled up.
3. See that aprons are worn, whenever possible.
4. See that goggles are worn at the grinder.
5. See that goggles are worn at the furnace when molten metal is being poured.
7. Keep all flames inside the furnaces.
8. Supervise lighting the furnace.
9. Set the toolrest on the grinder.
10. See that tools are kept off the floor.
11. See that oil is wiped up off the floor.
12. See that oily rags are placed in the covered metal container.
13. See that there are no mushroomed tools used.
14. See that no files are used without handles.
15. Inspect the first-aid cabinet.
16. See that all cuts are properly dressed.
17. Prevent "horseplay" in the shop.
18. See that finger rings are removed.
19. See that the crib boy does not give out any defective tools.
20. See that no safety guards are removed from machines.
21. See that no pieces of hot steel are left lying about unmarked.
22. See that a machine operator does not walk away from his machine while it is running.
23. See that belts on the countershaft are shifted with the belt stick.
24. See that lathes are stopped before shifting the belts on the spindle cones.
25. See that no rags are used around the machines while the main power switch is on.
26. See that work on the drill press is held in a vise or firmly clamped.
27. See that boys do not stand directly in front of the grinding wheel.
28. See that every machine is released before throwing on the main power switch.
29. Report any infractions of the "Safety Rules and Regulations," or any other unsafe practices that come to his attention.
30. Report all accidents to the instructor and make out accident reports to be handed to the instructor.
31. In his notebook, the safety engineer shall tell each day what he did to prevent accidents.

[1]This list of duties is reprinted from "Safety Education in the School Shop," *Bulletin No. 226*, which was prepared by Mr. Hugh McKinnon, machine-shop instructor, Miller Intermediate School, Detroit, and Mr. Gordon Graham, safety engineer, Detroit Board of Education, approved by the Research Coördinating Committee of the Michigan Industrial Education Society and printed by the State Department of Public Instruction.

TITLE PAGE AND INDEX FOR VOLUME 22 NOW AVAILABLE

A title page and index for Volume 22 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has been prepared for the readers who bind their magazines. A card addressed to the publishers at 524–544 N. Milwaukee St., Milwaukee, Wis., will bring a copy.

Problems and Projects

CHART OF TYPICAL PROBLEMS IN CORNICE AND SKYLIGHT LAYOUTS

C. H. Derby, Erie, Pennsylvania, and J. F. Faber, New York City

(See Supplement No. 279)

The chart entitled "Typical Problems in Cornice and Skylight Layouts" illustrates the necessary views and methods used to develop the patterns for the more common problems of metal cornice work. It must be remembered that the most important part of cornice layout is to show the views and profile in their true relation to each other. A thorough working knowledge of projections is therefore a prerequisite for this work. The method used to develop the patterns is simple parallel-line development.

Figure 1 (see Supplement No. 279) shows a pediment over the entrance to a porch. The cornice of the pediment forms a face miter at the ridge and at the point of intersection with the upper section of the porch cornice. It also forms a butt miter as it intersects the flat surface above the lower section of the porch cornice. The porch cornice makes a square miter as it intersects at the corner of the porch.

Figure 2 needs no explanation other than that given in the drawing.

Figure 3 shows a cornice on all sides of a square or rectangular building with a single pitch roof. The original profile is shown in section C. The method of projecting from plan to elevation by which the profiles for sections A and B are developed, is shown. The patterns are developed by parallel-line projection.

Figure 4 shows the method for developing the profiles and patterns for a cornice when the miter line does not bisect the angle of the cornice, thus making one section of the cornice deeper than the other and making it necessary to develop a deeper profile for one section. Either profile may be the original given.

Figure 5 shows the plan, elevation, and patterns for all parts of a hipped skylight. This involves practically all the principles used in skylight layouts, an understanding of which will enable one to solve any skylight problem.

AN ACCURACY TEST FOR THE DRAFTING ROOM

H. V. Olds, South High School, Youngstown, Ohio

It is frequently difficult to impress the student of mechanical drawing with the fact that accuracy in laying out measurements is of the greatest importance. The following type of test is helpful in finding out whether they are developing accuracy.

The test problem can be placed on a 7 by 9-in working space. All lines should be light construction lines.

1. Draw a horizontal line 1½ in. above the lower border line.

2. Upon this line, locate point A, 2 in. from the left-hand border line.

3. From A draw a vertical line upward, and upon this line locate point B 2¾ in., using a full-sized scale.

4. From B draw a line at 45 deg. upward to the right, and upon this line locate point C, 2 ft. 7½ in. to a scale of 1 in. equals 1 ft.

5. From point C draw a line down and toward the left, making 60 deg. with the horizontal. Upon this line locate point D, 7 ft. 6 in. from C, laying off the dimension to a scale ¼ in. equals 1 ft.

6. Through D draw a horizontal line, and upon this line locate E, 2¾ in. to the right of D, using a full-sized scale.

7. From point E draw a line making 60 deg. with the horizontal and slanting upward to the left. Upon this line locate point F 3 ft. 9 in. from E, using a scale, ½ in. equals 1 ft.

8. Through F draw a horizontal line to the right, and upon it locate point G, 18 in. from F to a scale of 1½ in. equals 1 ft.

9. From G drop a vertical line downward and upon it to a scale of 3 in. equals 1 ft., locate H 20½ in. from G.

10. Through H draw a horizontal line to the left. Upon this line locate point J, 5 in. from H using a full-sized scale.

11. Is J above, at, or below A? .....

12. What distance, if any, is there between A and J? .....

LANDING GEARS FOR FLYING STICKS

Terence Vincent, Los Angeles, California

Take-offs and landings, just like with real airplanes, are possible if landing gears are put on flying sticks. The simple, rubber-powered skycraft, miscalled "model" airplanes, may be built so as to have various methods of rising from the ground and alighting without crack-ups. Genuine joy comes to the flyer when his tiny aircraft makes perfect take-offs and perfect landings.

Two simple landing gears are herewith shown and described. One is a combination bearing for the propeller shaft and landing gear; the other is a detachable landing gear which may be used on either pushers or pullers, and with motors operating either under or over the motor stick.

The Vincent Landing Gear and Bearing

Figure 1 shows a combined gear and bearing. As shown, this landing gear is mounted with a motor operating above the motor base. It also could be used just as easily with the motor operating beneath the motor base if the bearing were bent downward instead of upward, as shown in Figure 1.

As shown in Figure 2, the motor base is slit with a saw in the front. The upper horizontal prongs of the wire landing-gear frame are placed in this slit, and a liberal supply of aircraft cement (any kind of nitrocellulose cement) is spread over and around the wires. Before the cement dries, care must

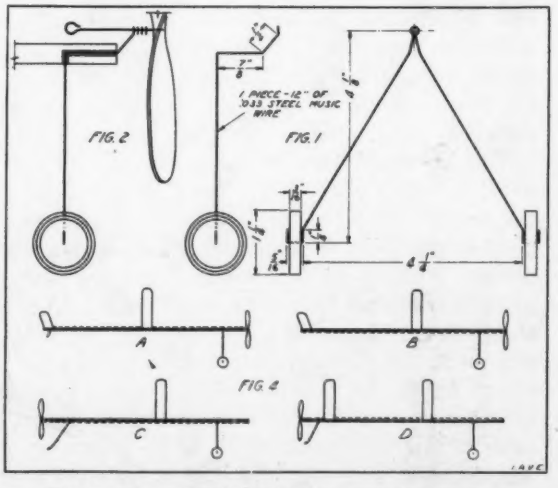


Fig. 1 and 2. Combined bearing and landing gear.
Fig. 4. Various landing gear mountings.

be taken to see that the top face of the motor base is parallel to the ground. Otherwise weird take-offs and landings are likely to occur.

Snap-On Landing Gear

Figure 3 shows another type of steel-wire landing gear. This is made exactly like the one previously described except that the top part is made like a clip which can be snapped around the motor base. The bearing in this case is made as a separate unit.

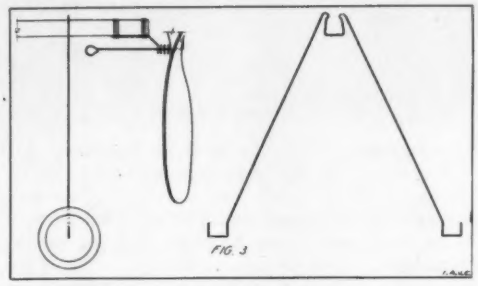


Fig. 3. Detachable landing gear.

In order that the landing gear may be securely held in place, the clip opening should be made a trifle smaller than the width of the motor stick. To make it doubly secure, it may be well to saw a very shallow saw kerf into the motor base on the three sides touched by the wire. With the clips slipped into these saw cuts, the landing gear is doubly secure.

It may be further cemented and tied in place if the flyer is sure that he has placed it in the right location. The propeller-shaft loop should miss the landing-gear wires by about an inch.

Figure 4 shows four sketches to indicate some of the possible ways of locating these landing gears. At A, Figure 4, is shown a puller or a tractor with the propeller in front and the motor above the base. At B is shown the same arrangement with the motor underneath the base. C shows a pusher plane with the propeller at the rear, the motor beneath the base, and the landing gear at the front, away from the propeller. D shows the same pusher plane with the motor above the motor base. Both C and D show tail skids which may be made of steel wire or bamboo. They should be cemented firmly to the motor base. These skids should be made sufficiently high to keep the propellers off the ground. The tail skids may be made exactly like the detachable landing gear shown in Figure 3, except that the wheels are omitted.

CHRISTMAS CARDS FOR HAND COLORING

D. Elizabeth Roberts, Philadelphia, Pennsylvania

The cards shown herewith offer original Christmas designs for hand coloring. The outlay for materials is small, and either ready-made or hand-made envelopes may be used.

If cuts can be procured, these cards may be printed in quantities. If this is impossible, make a good tracing of the chosen design, and transfer it lightly to cards cut to the required size. Instead of using carbon paper, which is likely to make the outline too heavy, go over the outline of the design on the wrong side of the tracing, using a soft pencil. Then place the tracing on the card and trace with a hard pencil. Ink in the outline with India ink and fill in the black

surfaces either with a broad pen or a fine brush. Do the lettering free-hand with a fine pen, or the straight lines may be made with a ruling pen. When the ink is dry, tint with water colors.

Use 5 by 4-in. cards for all designs except No. 8. Either white or tinted cardboard may be used.

Design No. 1 is a simple conventional scene, and is very easy to handle. The moon and stars may be done in either yellow or gold water color. Place a few touches of dull blue in the foreground and some green in the trees. The Christmas touch is given by the red house and chimney and red initial letters.

Design No. 2 shows a conventional holly and candle design which, of course, is done in red and green. Use two tones of green for the leaves. The bright-red candles have orange flames.

Gold initials form a pleasing contrast to the red and green of the holly in design No. 3. The border around the design could be left white or done in gold.

For design No. 4 the holly leaves should be two tones of green, the stems brown, and the berries bright red, with a red candle to match. The candlestick could be a reddish brown with gold bands, the flame of the candle orange, with the circular space around it a bright yellow.

Design No. 5 is attractive with the sky done in gold, leaving the clouds white. The trees are done in green, with the upper edges of the branches left white. There should be touches of yellow and blue in the path, and the house may be done in brown, with the windows gold, and the chimneys red.

Design No. 6 is on tinted paper, with the foreground and also the roof of the house left the color of the paper. Place a few touches of gray or blue in the foreground. The trees are to be green with the trunks brown, the moon and stars gold, and the house and chimney a bright red.

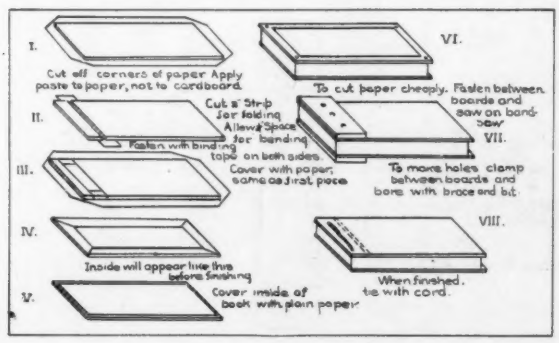
Design No. 7 is attractive with gold candlestick and flame and reddish brown candle to contrast with the bright red and green of the poinsettia.

Design No. 8 is a folder which measures 4⅞ by 6 in. when folded. It takes a piece of light-weight cardboard or a good firm paper, measuring 9¾ by 6 in. The sky may be tinted blue, leaving the clouds the color of the paper. There should be touches of blue in the foreground and touches of green on the trees. The windows and door could be green or gold. The border around the card may be left the color of the paper or done in gold. Any appropriate sentiment or verse could be lettered on the inner leaf.

INEXPENSIVE SCRAPBOOK COVERS

R. H. Jenkins, Humboldt State Teachers College, Arcata, California

The cardboard from pasteboard cartons, and some discarded rolls of wall paper, offer an interesting supply of material for making protective covers for the current numbers of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION Magazine; scrapbooks for shop clippings, draftings, and notes; waste-


I.
Cut off corners of paper. Apply paste to paper, not to cardboard.
II.
Cut a Strip for folding. Allow Space for bending
Fasten with binding tape on both sides.
III.
Cover with paper, same as first piece
IV.
Inside will appear like this before finishing
V.
Cover inside of book with plain paper
VI.
To cut paper cheaply. Fasten between boards and saw on band saw
VII.
To make holes clamp between boards and bore with brace and bit
VIII.
When finished, tie with cord.

Some examples of the use of scrap cardboard, pasteboard, and wallpaper.

baskets; writing-desk pads and blotters are a few of the suggestive things which may be made, and the cost is practically nothing.

Any grocery store will gladly furnish the boxes, and the wall paper, by buying odd rolls, may be purchased as cheaply as ten cents a roll. Either the solid or the corrugated pasteboard may be chosen and fitted especially to the work at hand. Butcher paper, at 10 cents a pound, makes excellent stock for leaves for the scrapbook. If a plain surface is desired, the back side of the wall paper should be turned out.

Paste, made from flour with boiling water, gives excellent results, and is much cheaper than library paste. A strip of binding tape or cloth should be used to strengthen the cover where it bends. The front and back of the cover need not be fastened together on the back edge, as the two parts may be tied together with a shoe string or cord. Only the top half of the cover needs to be jointed.

A knife, a pair of tin snips, or a saw will cut the cardboard. Holes may be made with a brace and bit for the notebook, and a ticket punch or nail for the wastebasket.

Very satisfactory results were obtained in grades as low as the fifth and sixth, so that the material offers possibilities for grade handwork.

MODEL SAILING BOAT

W. L. Dorrance, Whittier Junior High School, Lorain, Ohio

It is hard to find a project which appeals more to the junior-high-school boy than does a model boat. A maximum number of tool processes are included in a project of this type. It is, therefore, also desirable from an educational standpoint. Another item of importance is its low cost of materials. Much of it may be found by the student at his home.

The illustrations and the text given herewith, it is hoped, will help the student carry the work through with but little help from the instructor.

Figure 1 shows the block from which the hull is to be shaped. Either white pine or basswood may be used. The stock should be free of knots and cracks, and the block should be squared to the dimensions given.

Figure 2 shows how to mark off the deck plan. First, draw a center line lengthwise of the block. This line should go entirely around. Measure off the spaces marked A, B, C, D, and E, and lay off the distances shown, on each side of the center line.

Figure 3 shows the outline drawn through the joints laid off in Figure 2. To draw this outline, drive pins or very fine brads just inside the points through which the lines are to pass. Bend a thin strip of wood or cardboard about the pins and draw the line.

Figure 4 shows the hull cut to the lines just drawn. Extend the lines A, B, C, D, and E, all the way around the block. These lines will be used in shaping the hull to the desired form.

Figure 5 gives the curves to which the templates are to be cut. These may be made of cardboard or tin. (See page 384.)

After making the five templates, of which Figure 5A is an example, screw or nail a block to the upper surface of the hull block, for holding the work while it is being shaped.

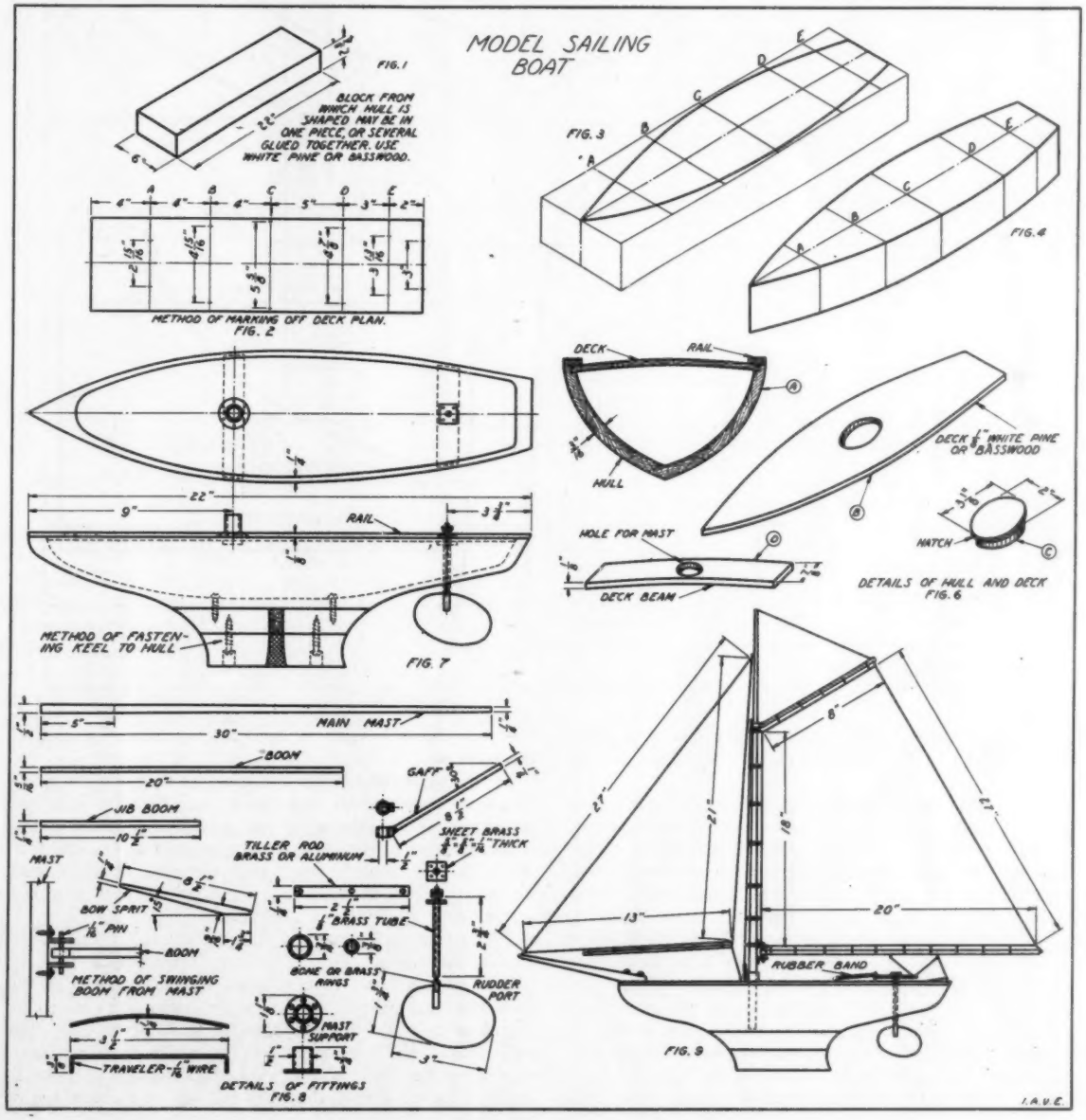
By means of a drawknife and spokeshave, cut away the block on either side of the center line until it conforms to the shape of the template for each station. These templates should be tried often and only a little wood should be taken off at a time. After the block has been cut to the desired shape, sandpaper it thoroughly, taking out all scratches and tool marks.

Then fasten the block to the bench top by means of a hand screw clamp or by nailing four pieces the thickness of the block along the sides. Small strips nailed across these will hold the work securely while it is being gouged out. The work of gouging out the hull should be done with much care, taking off but a little at a time. When finished, the hull shell should be about 3/16 in. thick, except at either end where it should be left a little thicker.

Make a piece (white pine) 1¼ in. thick, 2 in. wide, and 10 in. long, and fasten it with waterproof glue to the bottom of the hull. After the glue has set, drill down from the inside and reënforce with two screws, which should go through the bottom of the hull and well into the piece just glued on. This piece should be shaped to the hull, and when finished should measure about 6½ by 5⅝ in. on the bottom. To this surface the keel will later be fastened, as shown in Figure 7.

Figure 6 gives the details of the deck and hull. There are two deck beams, which are placed as shown in Figure 7.

The deck is made of ⅛-in. whitewood. Before marking out the deck shape, square one edge and with the gauge make marks ¼ in. apart which gives the appearance of planking. Lay the hull down upon the deck board and mark around it with a pencil. Cut to the line with a sharp knife. With a pencil and the finger for a guide, draw a ⅛-in. line around the deck. When cut to this line, the deck should fit down into the rabbet which is cut into the top edge of the hull, as shown at A in Figure 6. The deck beams have a slight curve which makes the deck a little higher at the center. The hatch may be cut into the deck before or after it is fastened down.



The deck may be fastened with small brads and glue, after which the railing shown in Figure 7 is glued and nailed into place. It is much easier to fasten this railing on in sections.

To make the keel, draw a paper pattern of the wooden piece added to the hull. Half of the pattern is then marked on one block of white pine and half on another. Cut out each block to a depth of 1½ in. When the two blocks are then placed together, the shape of the carved-out portion should resemble that of the cross section shown in Figure 7. Clamp the two pieces together and pour melted lead into the mold thus made. When the lead has cooled, drill two ⅜-in. holes part way through and ⅛-in. holes the rest of the way. Fasten the keel to the hull with screws and then file the lead to the finished shape.

Figure 8 gives the construction of the fittings for the deck. The mast, boom, jib boom, gaff, and bowsprit are shaped out of straight white pine. The mast support is made by soldering a piece of ½-in. brass tubing to a brass washer. This support is then fastened to the deck with small brass screws, two of which should go through the deck beam. After the mast support is in place, drill the hole for the mast through the deck. This should line up with the hole already cut through the deck beam. Hold the bit straight and then push it down until it touches the bottom of the hull and drill a hole about ¼ in. deep. The bottom of the mast is beveled, and when pushed down into this hole, the mast will be rigid.

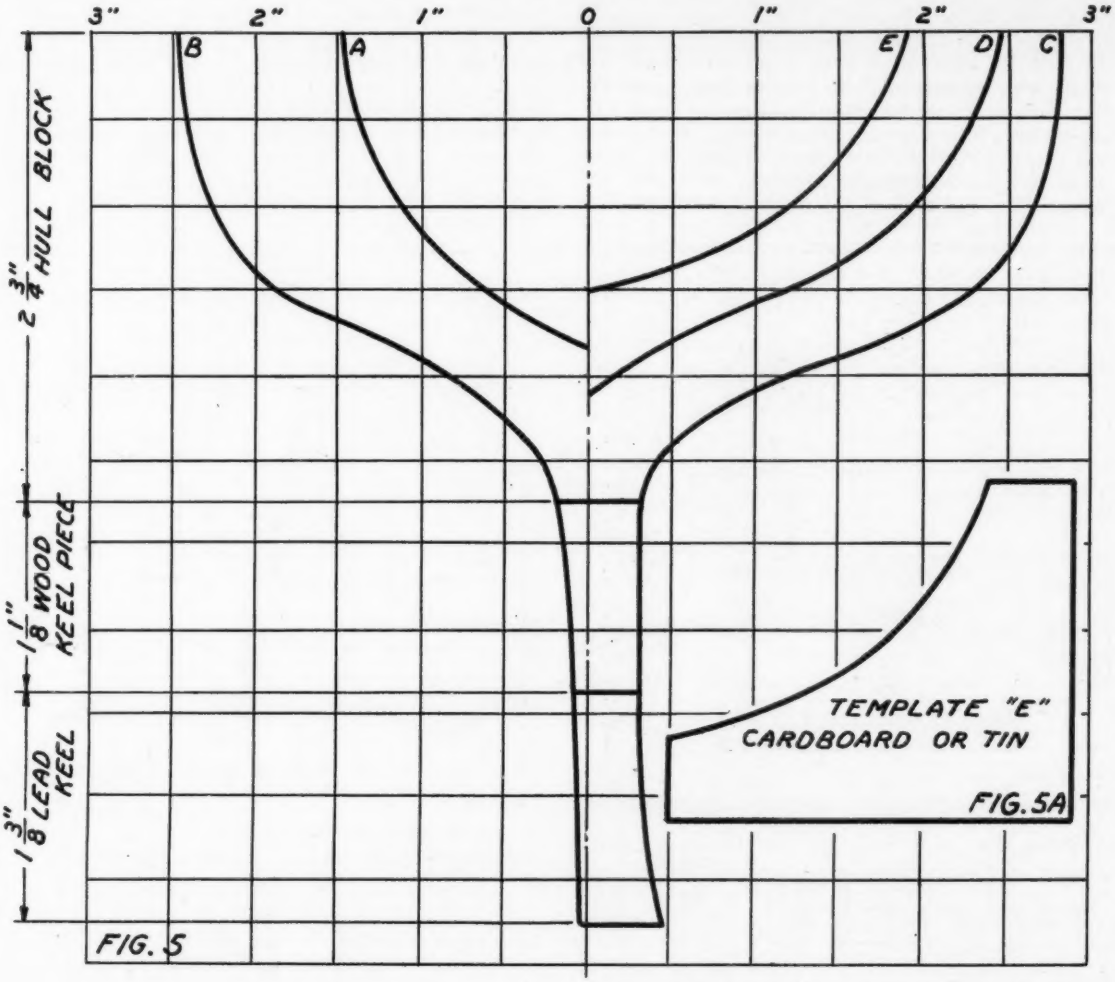
The rudder is made of heavy tin or galvanized iron. A short length of brass tubing is sawed lengthwise for a little distance. This is slipped down over the rudder and soldered in place. Secure a piece of wire, such as a bicycle spoke, hammer one end flat and solder this into the piece of tube fastened to the rudder. The rudder port should protrude a short way above the deck. It is held in place by the square or brass soldered to it. In drilling the hole for the rudder port through the deck and the bottom of the hull, be careful to get it straight. Push the rod attached to the rudder up through the port, and then fasten the tiller rod to it.

There are two travelers, one of which is placed just ahead of the mast and the other at the stern. These are secured by pushing the ends of the wire into small holes drilled into the deck. A small brass or bone ring should be on each of the travelers.

The boom is swung from the mast, as shown in Figure 9. The small angles which hold the pin may be made from the attachment of an old electric wall plug.

The gaff ring or slide is made of a piece of sheet aluminum. Make the ring slightly larger than the mast at its greatest diameter. This is fastened to the gaff by means of glue and a small rivet made of any soft metal.

Figure 9 gives the cut and size of the sails as well as the method of rigging them. The bone rings, which may be bought in any 5 and 10 cent store, should be sewed to the sails with heavy thread. The sails are raised and lowered by means of fish line threaded through small screw eyes. The rubber band which serves to pull the rudder back into position when the force of the wind upon the sail changes, is fastened to one end of the tiller rod and to a screw eye in the deck.



The upper part of the hull may be painted a dark blue and the portion just above the keel, black, leaving the keel natural. The railing should be white and the deck should be finished natural. Two or three coats of the paint should be applied. This is then to be followed with two coats of waterproof varnish. All small holes and cracks, as well as the opening for the rudder port, and about the mast, should be filled with plastic wood. The spars should be finished with a coat of shellac and two of varnish.

If desired, a small cabin may be placed just back of the mast and over the hatch. The hatch cover should fit tightly. It may be made waterproof by gluing a strip of felt around the flange which touches the deck.

TWO INTERESTING PUZZLES

John B. Clothier, Jr., Lansdowne, Pennsylvania

Checker-Board Puzzle

With a T square and triangle, lay out the checker board shown in Figure 1, on a piece of heavy paper or cardboard. Cut the pieces apart on the heavy lines. Then try to place them together in the form of a checker board.

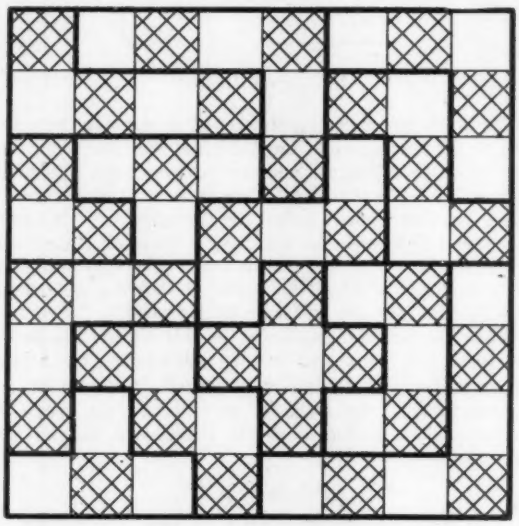


Fig. 1. The checker-board puzzle.

The Catacombs

Lay out the design shown in Figure 2. Then draw in the heavy lines as indicated. Mark the two points in and out.

The object of this puzzle is to trace a path through the labyrinth starting at the point marked "In" and coming out at the point marked "Out." Every time a dead end is reached, go back to the entrance and try again. Keep a count of the number of starts that have to be made before the tracer is successful.

SAFETY RULES FOR THE MACHINE SHOP

Richard Pfister, Essex County Vocational School for Boys, Newark, New Jersey

Lathe Safety

Remove chuck key from chuck before starting machine.
Keep waste away from moving parts.
Remove chips from machine with brush (never use your hands).
Keep fingers away from all moving parts.
Stop machine before attempting to measure job.
Stop tool-post grinder before trying center gauge or measuring work.
Turn machine by hand when taking off or putting on a chuck.
Remove tool from tool post before taking off or putting on a chuck.
Don't go up on a ladder while the power is running.
Be careful of wrench slipping and fingers striking sharp edge of tool bit.
Tailstock must be securely clamped when in use.
Balance faceplate when necessary.
Exercise care when holding work in hands while lapping.
Fasten machine reamer properly when reaming in lathe.

Shaper Safety

Keep hands or brush away from moving tool.
Stop machine before measuring job.
Clamp job securely.

Drill-Press Safety

Clamp work securely before drilling.
Hold small pieces with a clamp or monkey wrench.
Keep fingers away from chips and moving parts.
Keep waste away from revolving drill chips.
Remove chuck key before starting machine.
Loose clothing should not be worn while operating a machine.
Keep fingers clear of abrasive wheel when grinding drills, etc.

Bench Safety

Use goggles when chipping.
Chip in a safe direction.
Keep clear of flying chips.
Use files with handles.

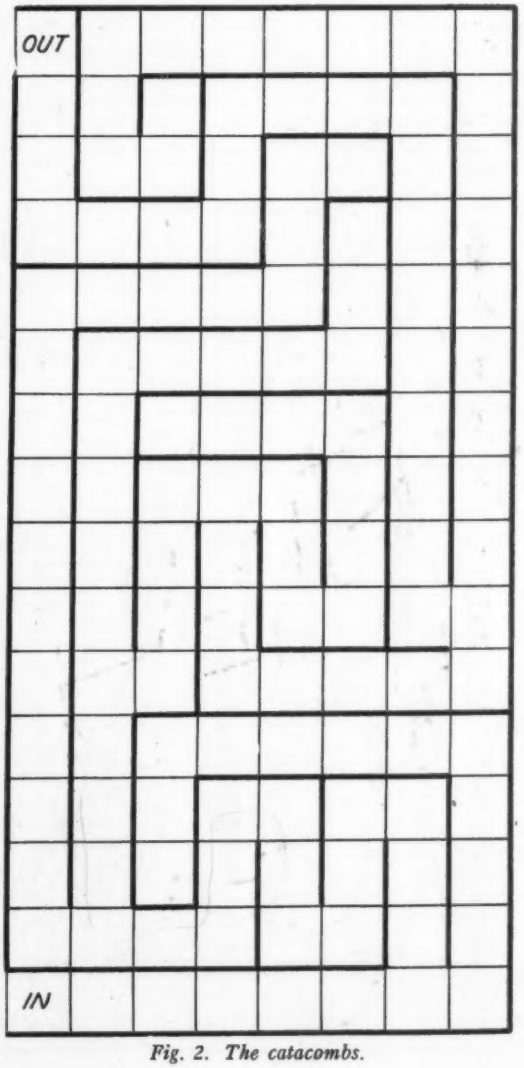


Fig. 2. The catacombs.

A cold chisel with a mushroom head should not be used.
Be careful of wrench slipping.
Exercise extreme care in handling electric drill.
Never allow water to come in contact with hot babbitt, lead, oil, or cyanide of potassium.

Milling-Machine Safety

Stop machine before measuring work.
Stop cutter from rotating before removing the chips with a brush. (Hands should never be used.)
Be careful in handling cutters.
Fasten work securely in machine.

Grinding Safety

Get proper instruction before attempting any grinding.
Wear your goggles.
Keep fingers clear of abrasive wheel.
Fasten wheel securely.
Keep wheel properly dressed.
Guard abrasive wheels properly.
Do not overload grinding wheel.
Wheel must be balanced.
Replace trip dogs after truing wheel on cylindrical grinder.

Heat-Treatment Safety

Be careful of flare-back when lighting furnace.
Do not allow a furnace to reach an excessive temperature.
Use care in quenching work.
Do not allow water to come in contact with hot oil, babbitt, lead, or cyanide of potassium (cyanide of potassium is deadly poison).
Never allow oil bath to catch fire through excessive heat.
Know how to combat oil fire.
Keep hands away from hot iron, lead, or cyanide.
Select proper tongs to hold work.

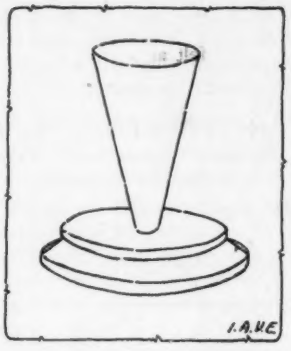
Miscellaneous Safety

Loose clothing should not be worn in the shop.
Always use a belt stick in mounting belts.
Never allow metal belt lacing to protrude on the sides of overhead belt.
Ladders must be securely placed and of proper construction.
Do not attempt to oil revolving machinery or countershafting.
Do not wear any rings.
Never remove guards from machinery.
Sleeves are to be rolled up to the elbows.

A HOLDER FOR SMALL PAINTBRUSHES

Gerald A. Boate, Seattle, Washington

When a number of small paintbrushes, each a different color, are being used, the tendency is to lay one down while the other is used for applying another color. The brush laid down is apt to be messed up and have its hair disarranged, or it may even roll down and fall among the shavings on the floor.



Paintbrush Holder.

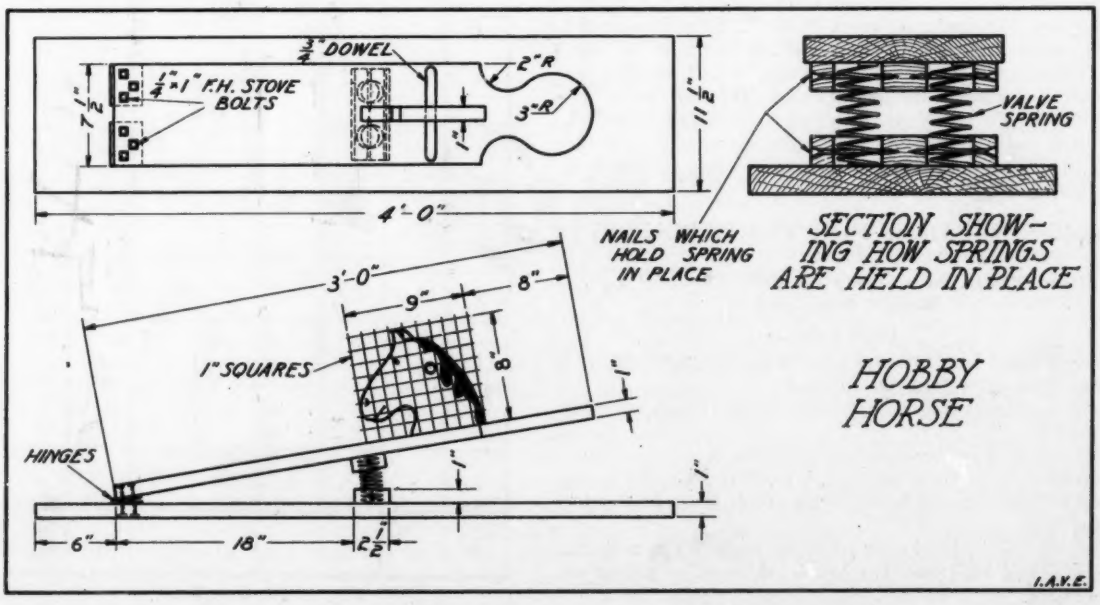
The brush holder described herewith is therefore very convenient for holding small brushes while they are being used. It is made by rolling up a quarter circle, drawn to a radius of 5 or 6 in. of any thin sheet metal, such as tin, copper, or brass. The edges where they come together may be slightly lapped and then soldered. The base is made of a wood disk, in the center of which a hole is bored that does not go entirely through the wood. The point of the cone is then permanently set into this hole with plastic wood.

When the brushes are placed in this holder, handle end downward, the bristle ends will not roll together and a brush for any color may be instantly selected. It is well to have separate holders, one each, for water colors, oil colors, and lacquers. These holders keep the brushes not only in sight but at hand.

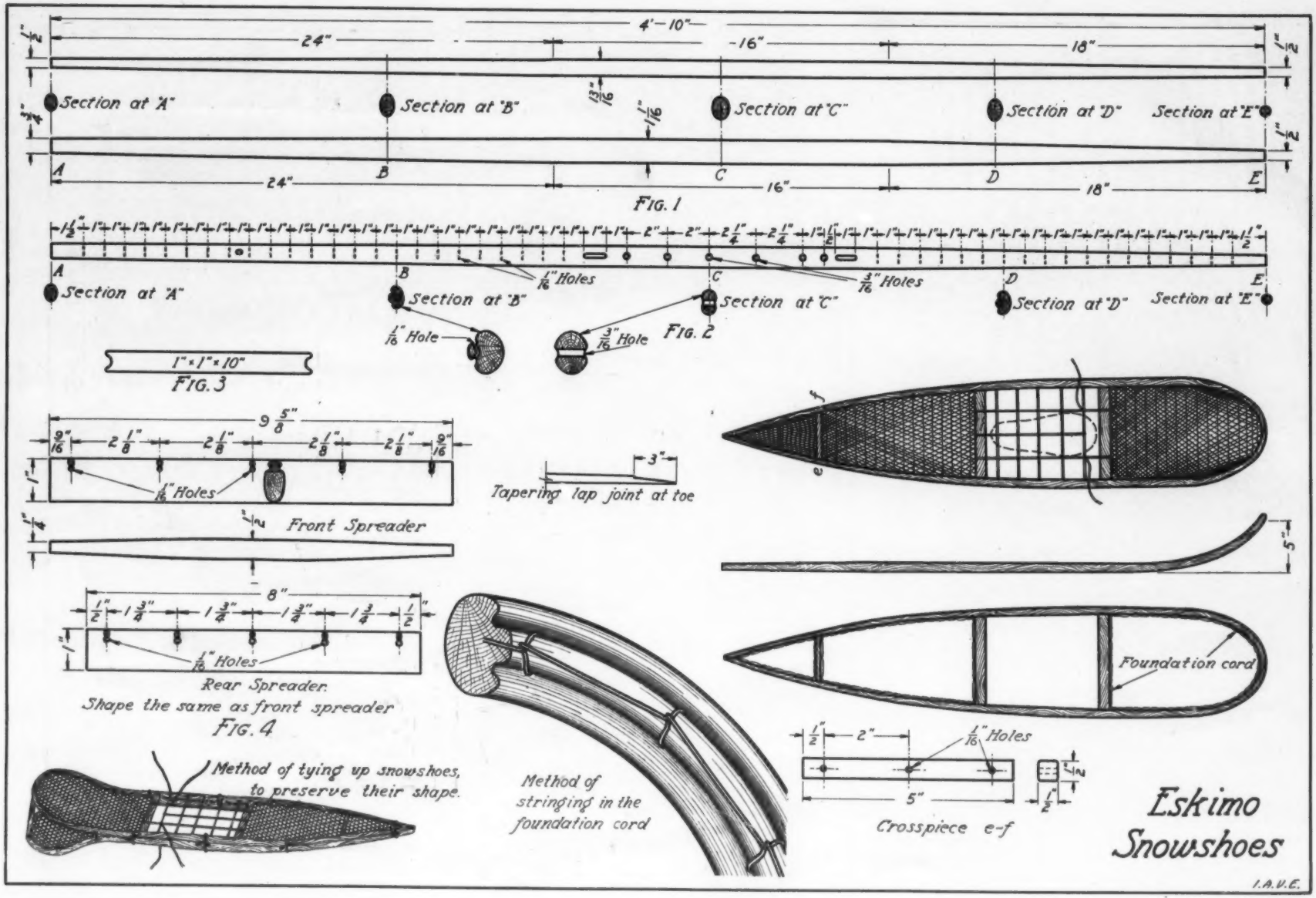
SNOWSHOES

H. W. Greig, Sheldon Jackson School, Sitka, Alaska

The making of snowshoes is not a precision job, but comes nearer to being a jackknife job. Few tools other than a knife



Hobbyhorse designed by Frederick T. Dacey, High School, Agawam, Massachusetts


4'-10"
24"
16"
18"
Section at "A"
Section at "B"
Section at "C"
Section at "D"
Section at "E"
A
B
C
D
E
FIG. 1
1/16" Holes
3/16" Holes
1/16" Hole
3/16" Hole
FIG. 2
1" × 1" × 10"
FIG. 3
9 5/8"
Front Spreader
Tapering lap joint at toe
8"
Rear Spreader.
Shape the same as front spreader
FIG. 4
Method of tying up snowshoes, to preserve their shape.
Method of stringing in the foundation cord
Foundation cord
Crosspiece e-f
Eskimo Snowshoes
I.A.V.E.

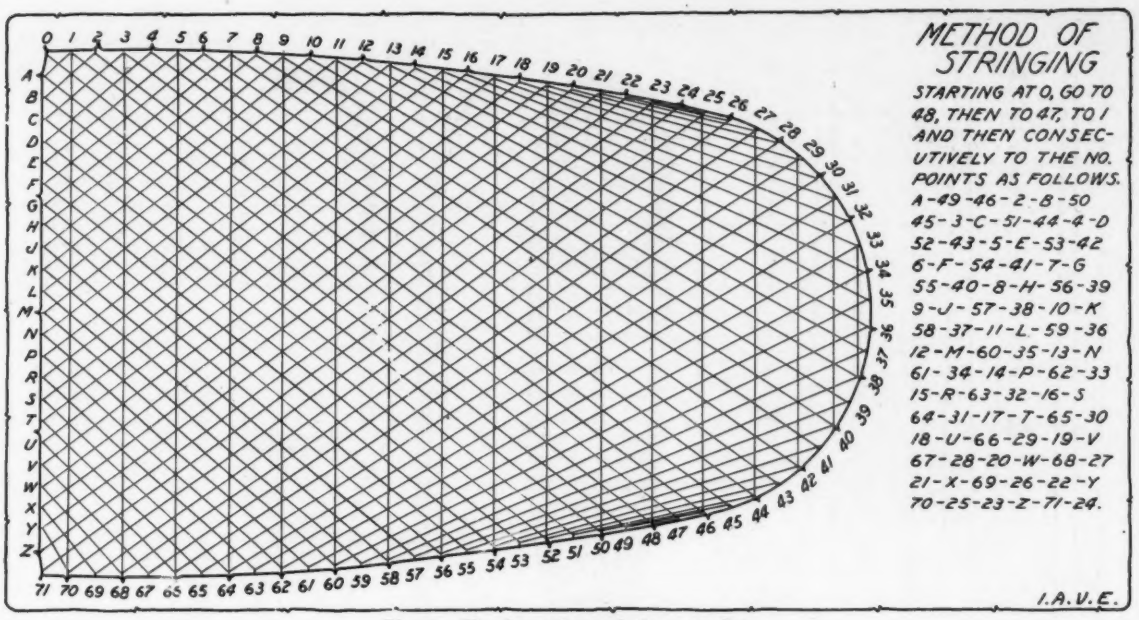


Fig. 5. The front part of the snowshoe.

are absolutely necessary, although several common tools may be used to expedite operations. Quite a variety of materials are satisfactory. As one Eskimo told me, one might use either willow or oak for the frame. The willow can be soaked pliable enough to bend, but the oak must be steamed. The ideal wood is light and tough. There is considerable variation in the shapes and spacings of the snowshoes that I have examined, but in order to avoid generalities I will describe the best-looking pair in our museum. These came from Noatak River, Arctic Alaska, in 1890.

The accompanying drawing gives all necessary dimensions. For the frames, choose the straighter grained ends for the toes. Begin at the heel and lay out the side pieces as shown in Figure 1. Then shave down all the corners reducing the pieces to an oval shape as shown in the cross sections in Figure 1. At the toe ends cut tapering lap joints about 3 in. long that can be securely held by lashing or other method of fastening. Make the front and rear spreaders shown in Figure 4 and cut mortises for them in the sides. Along the inside of each of these spreaders, cut two shallow grooves as in Figure 4, and bore 1/16-in. holes at the points indicated. Along the middle section of the side pieces, cut two shallow grooves as shown in the cross section at C in Figure 2 and bore 3/16-in. holes where indicated. The crosspiece *ef* is next made.

A form should now be built up and blocks fastened on it for bending and shaping the frame. The finished pieces should be soaked or steamed and secured in place till thoroughly dry.

When taken from the forms, the pieces must be securely lashed together at the toe and heel and all is ready for stringing. This process is similar to that of stringing a tennis racket, although for the snowshoes it need not be done so accurately. The cords for stringing this pair of snowshoes were made of animals' intestines, but any kind of strong cord that is sufficiently waterproof would be satisfactory. First run a strong foundation cord from hole to hole all around the side pieces, as shown in the illustration. A single cross at each hole serves

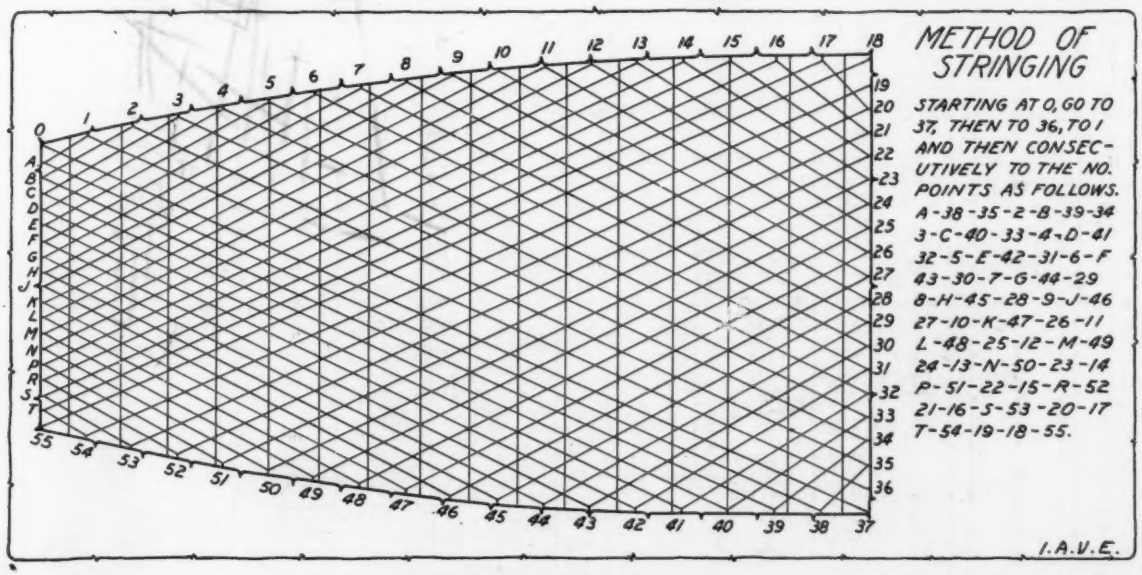


Fig. 6. The rear part of the snowshoe.

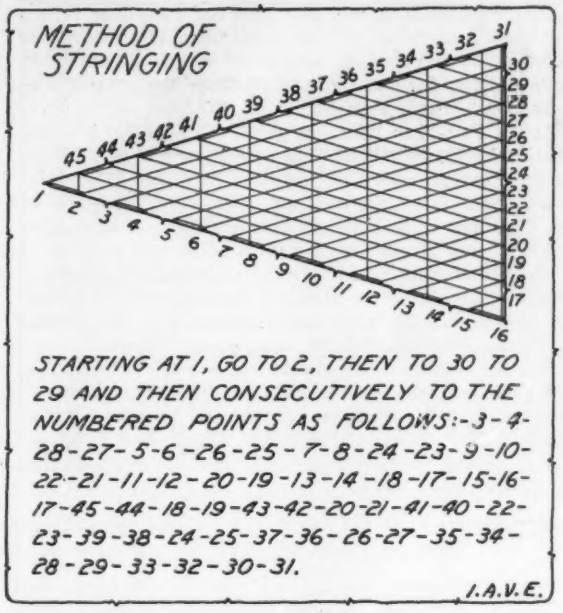


Fig. 7. Stringing the triangular end

to keep the cord running straight and parallel all along the wood pieces. The foundation cord on the spreader should be doubled or trebled because the holes are farther apart. Use a slightly smaller cord for laying in the diagonal lacings. Follow the directions for lacing as given in Figures 5, 6, and 7 in putting in this lacing. Always keep the lacing in two layers; all of the strings slanting to the left, on top, all those slanting to the right, below. Then the third layer, put in crosswise, is to be woven over the members of the upper layer and under the members of the lower layer, thus binding all into one fabric. This is very similar to the last layer of weaving in a cane seat in a chair.

The central section is laced with heavy cord or rawhide lacing. The strands go around the braces and through the holes in the side pieces as shown in the drawing. The longitudinal pieces are doubled, one strand on either side of the transverse strands and then wrapped to secure all in position. Thongs are attached, as shown, to tie over the toe of the boot and also back around the ankle.

The stick shown in Figure 3 is set between the toes of the two snowshoes when they are tied up, to keep them in shape, when they are not in use.

If a braided linen fish line is used to string the snowshoes, it might be varnished with celluloid dissolved in acetone, or with lacquer remover which may be made thin enough to penetrate. This gives a flexible finish.

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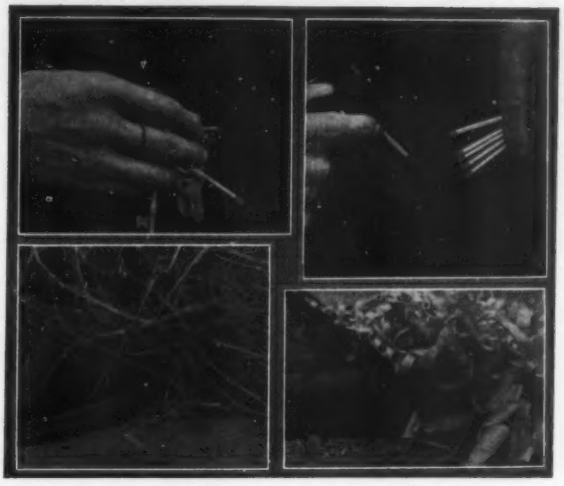
For the sake of the good that has already been accomplished, and to help reduce the ravages due to tuberculosis still more in the future — buy Christmas Seals.



Carelessness with matches may cause fires that take a serious toll of life and property. Be careful how you carry them. Submitted by Frank Bentley, Missouri Valley, Iowa

Personal News

RECEIVES ADDED RESPONSIBILITIES

Mr. Harry E. Wood, who has for several years had charge of the industrial-arts and vocational work in the public schools of Indianapolis, Ind., has been made Director of Practical Arts and Vocational Education. In addition to the supervision of vocational education and industrial-arts work, he will have charge of the administration of home-economics work. He will be assisted by Miss Louise Braxton, formerly a teacher in the Arsenal Technical High School.

HARRY E. WOOD

Mr. Wood's service in the Indianapolis schools covers a period of 32 years. Beginning as an assistant in the art department of one of the high schools, he became a teacher in that department. Later he was transferred to manual training in the graded schools. In 1912, he was made supervisor of the work in the graded schools, and in 1922 was appointed supervisor of vocational education and industrial-arts education in the high and graded schools.

Mr. Wood is president of the Indiana Industrial Education Association, and for the past five years has been secretary of the Western Arts Association.

—◎—

¶ A testimonial dinner in honor of MR. WILLIAM E. ROBERTS, of Cleveland, Ohio, was given on October 6, by the Cleveland School Arts Club. Three hundred teachers and friends were in attendance.

One of the highlights of the program was a review of industrial arts in Cleveland, by William Lambirth, the first teacher to come under Mr. Roberts' instruction. Mr. Roberts began his work in 1890 and Mr. Lambirth in 1893.

Mr. Roberts was presented with a bound volume of letters from members of the Mississippi Conference, a certificate from industrial-arts teachers, and a wrist watch. The presentation speech for the watch was made by Mr. Charles H. Lake, superintendent of schools, of Cleveland.

¶ MR. GEORGE W. FARNHAM, well-known publisher of vocational textbooks, has recently joined the staff of the International Textbook Company, Scranton, Pa., for the purpose of developing a series of college texts on engineering subjects. Mr. Farnham was graduated from Yale University in 1916, and taught drawing there for one year. Following his graduation, he was engaged in factory and production management. During the war he served as an officer in the Coast Artillery Corps, with a year in the A.E.F. as a captain.

¶ Among the industrial-arts teachers who received degrees in June, or at the end of the 1933 summer session at the State Teachers College, San Jose, Calif., the following are now teaching at the places indicated:

¶ HARRY KRYTZER, instructor in general shop, Galt Union High School; WILBUR MILLER, instructor in general shop, San Jose Technical High School; CHESTER CROWELL, instructor in machine shop, Portola Junior High School, San Francisco; CHARLES FERRELL, instructor in automotive mechanics, San Luis Obispo High School; ARTHUR MOHR, instructor in general shop, Galt Union High School; WILLIAM D. METTE, instructor in general metal work, Washington Union High School, Centerville; C. P. CARLSON, instructor in woodwork, Frick Junior High School, Oakland; GORDON HOFFMAN, instructor in general shop, Burnett High School, San Jose; and RAYMOND CASEY, instructor in metal work, Wilson Junior High School, San Jose.

¶ MR. GILBERT S. PEREZ, chief of the vocational division of the Bureau of Education, Manila, Philippine Islands, has received the honorary degree of doctor of pedagogy from Bucknell University.

Associations, Conventions

AMERICAN VOCATIONAL ASSOCIATION MEETS AT DETROIT

The American Vocational Association will hold its annual meeting December 6 to 9, at Detroit, Mich., taking for its theme, "Vocational Education for Relief and Reconstruction." The headquarters for the convention meetings will be the Hotel Statler.

An extensive and varied program has been prepared, providing for both general sessions and sectional meetings for the various departments of the association.

The Department of Industrial Education will discuss the topics of "Methods Used in Selecting Vocational Instructors," "The Upgrading of Teachers in Service," "Procedures Used in Meeting the Needs of Individual Students," "The Basis and Methods for the Certification of Vocational Teachers," "New Activities to Aid the Teacher in Service," "The NRA and the Preëmployment Training of Junior Workers," and "Back to Work Through Vocational Training."

The trade-school principals also will hold a sectional meeting. At the joint Industrial Education and Part-Time Education session, the topic of "The Unadjusted Worker and the Coördination of Vocational Education" will be discussed. Dr. Fred J. Barr, Dayton, Ohio, will talk on the subject "Coördination Through Psychiatry."

At the Part-Time Education session, Miss Ethel Wooden, Pontiac, Mich., will talk on "The Development of Social Intelligence Through Work Experience and Part-Time Education." Other topics to be discussed are, "The Changing Status of the Part-Time School," "Full-Time Attendance in Part-Time Schools," and "Human Adjustment in Industry."

The Department of Industrial-Arts Education will be in charge of Dr. Arthur B. Mays, of the University of Illinois. A luncheon meeting, under the chairmanship of Dr. William E. Warner, also will be held.

The Rehabilitation Department will discuss the topic, "Coöperation Through Employment." Talks will be given on such subjects as "The Federal Employment Program," "State Employment Standards," "Municipal Employment Progress," "Working with the Industries," and "Methods of Coöperation in Rehabilitation Work."

OCTOBER MEETING OF THE BOSTON VOCATIONAL SOCIETY

The Vocational Education Society of Boston, Mass., held its regular meeting on Saturday, October 14. At this meeting, it was decided to change the name of the organization to Massachusetts Industrial Education Society. Its scope was enlarged and it was hoped that the society, in becoming statewide, would be in a better position to serve the interests of the manual-training and industrial-arts teachers scattered throughout the state.

The speaker of the evening, Mr. John F. O'Brien, who represented the state recovery board of the N.R.A., explained in a forceful way the ideas of the N.R.A., and the operation of the national program.

The officers elected for the coming year are: President, Mr. Hugh J. Cox; vice-president, Mr. Arthur H. Kipp; secretary, Mr. Charles A. Bossi; treasurer, Mr. L. A. Van Ham; and librarian, Mr. Matthew Durgin. — *Louis A. Van Ham.*

MEETING OF THE PITTSBURGH INDUSTRIAL-ARTS TEACHERS

The industrial-arts teachers of Pittsburgh held their regular meeting on October 6 and 7, at Carnegie Union, Carnegie Institute of Technology, Pittsburgh, with five hundred teachers and supervisors in attendance. Dr. David Snedden, of Columbia University, gave the principal address. He talked on the subject, "Education of all the Children of All the People." He proposed to increase the school-age limit and to keep the children in school until 18 or 21 years of age.

Dr. C. R. Hoechst, director of extension education of Pittsburgh, told of the evening-school program in Pittsburgh, with 13,000 students enrolled. Mr. F. T. Spaulding, of Harvard University, gave a talk on "Guidance versus Direction in the Junior High School." A feature of the meeting was an exhibit of the work from the Pittsburgh Trade Schools in the Carnegie Library.

PITTSBURGH ASSOCIATION MEETING

The Trade and Industrial Education Association of Pittsburgh, Pa., held an open meeting on September 30, in the Taylor Alderdice High School, Pittsburgh. A total of 125 teachers and supervisors were in attendance at the meeting.

Among the speakers of the evening were Mr. Leavitt, Mr. Boland, and Mr. Spear from the Pittsburgh schools; Mr. Glen U. Cleeton for Carnegie School of Technology; Dr. Whitney from the University of Pittsburgh; and Mr. Rohmer of the Pennsylvania Vocational Association. A dinner was served in the school cafeteria. — *James S. Dodds.*

(Continued on page 8a)

will occupy BOOTH A

at the Eighth Annual Convention of the A.V.A. to be held Dec. 6 to 9 at the Hotel Statler, Detroit

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(Continued from page 390)

MEETING OF THE PEORIA INDUSTRIAL-ARTS CLUB

The first monthly meeting of the Peoria Industrial Education Club for the 1933–34 season was held on Monday, October 16.

The evening program was in charge of two speakers. Mr. F. L. Barloga, of the Peoria High School, gave an illustrated talk on "Cave Explorations in Missouri and Arkansas," and displayed specimens of cave formations.

Mr. A. F. Siepert, of the Bradley Polytechnic Institute, Peoria, spoke on "Training Industrial-Arts Teachers and the Present School Situation." He presented each member with a sheet of interesting statistics on large and small high schools with reference to the type of work dropped during the economic crisis. He maintained that industrial arts had held its own in both the large and small high school, and he predicted that there would be an increased demand for teachers in the near future.

A total of 30 members of the club were present, representing the Peoria schools, Bradley Institute, Catapillar Training School, Manual Arts Press, and the schools of Pekin and Elmwood. — *F. L. Barloga.*

New Publications

Automotive Service — The Engine

By Ray F. Kuns. Paper, 6 by 9, illustrated. Reprinted in five separate pamphlets, viz., Part I — Power Plants and Power Generation, 66 pages, 40 cents; Part II — Functions of Engine Parts and Their Repair — I, 120 pages, 48 cents; Part III — Functions of Engine Parts and Their Repairs — II, 82 pages, 44 cents; Part IV — Oiling Systems and Cooling Systems, 59 pages, 36 cents; and Part V — Fuel Systems, 86 pages, 40 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

The pamphlets enumerated in the foregoing are an attempt to make Ray Kuns' *Automotive Service* with its comprehensiveness and thoroughness more serviceable in the school shop. Each of the five parts is bound separately in paper. The pamphlets are so reasonably priced that no student need be without them. They may be purchased one at a time as needed.

A Student's Work-Book in Guidance

By Verl A. Teeter and Arthur C. Douglass. Paper, 139 pages, 8 by 10½. Price, 90 cents. Published by McGraw-Hill Book Company, New York City.

This book is arranged with explanatory material, directing the student's activities in his study of occupations. It contains comprehensive references, and space is furnished so that the student can enter his answers and record his observations.

Plant Training Classes for Employed Workers

Issued by the Department of Public Instruction, Harrisburg, Pa. The pamphlet offers a program for organized training and instruction of employed workers. It discusses hours of training, meeting of classes, organization of classes, and requirements on the art of industry.

Basic Woodworking Processes

By Herman Hjorth. Cloth, 221 pages, 6 by 9, illustrated. Price, $1.48. Published by The Bruce Publishing Company, Milwaukee, Wis.

This handy reference book will be found very useful by the beginning woodworker in school and home shop. It contains clear, definite instructions, thoroughly illustrated with halftones and line drawings, for all of the basic woodworking processes that the woodworker meets in the making of woodworking projects. It not only describes the operations of sharpening tools, sawing, planing, chiseling, and boring, but also how to lay out and plan jobs, make joints, fasten the

(Continued on page 9a)

(Continued from page 8a)

parts together with nails, screws, and glues, attach hardware, and apply the final finish.

Industrial Arts for Public School Administrators

By Frederick G. Bonser. Cloth, 95 pages, 5 by 7½. Published by Bureau of Publications, Teachers College, Columbia University, New York City.

In this small volume the author succeeds in condensing in very readable fashion the problem that confronts the superintendent of schools under the term "industrial arts." The objectives, content, method of instruction, organization of courses, supervision, equipment, and method of testing are all discussed.

A bibliography of selected reading on the industrial-arts field is appended.

SchoolShopEquipmentNews

NEW OLIVER TOOL GRINDER

The Oliver Machinery Company, Grand Rapids, Mich., has announced a new oilstone tool grinder, containing most of the features of the larger types, but intended to sell at a price within the reach of the smaller school.

The Oliver oilstone tool grinder has been designed with present-day needs of the industrial-arts training shops, especially those of the junior high school in mind. It is suitable for sharpening chisels, gouges, knives, plane bits, and other edge tools. It is equipped with a ¼-h.p. motor and may be attached to any lamp socket. The oilstones, 6 in. in diameter, comprise one coarse and one fine, and in addition, an 8 by ½-in. dry grinding wheel. The grinder is suitable for both face and side grinding, and the rigid cast-iron table may be quickly tilted to any desired position. Additional equipment in the way of stropping wheels, eye guards, etc., may be furnished.

ATKINS COMPANY OFFERS DEMONSTRATION SAW

E. C. Atkins & Company, 404 South Illinois St., Indianapolis, Ind., is offering to lend a demonstration saw to instructors in school-shop classes. The saw in actual use has proved a valuable aid in teaching pupils how to care for and use hand, rip, and panel saws. The saw is available to any instructor for a period of eight weeks. There is no charge for its use, but the instructor must agree to return the saw in good condition at the expiration of the loan period.

The saw is fitted with different sizes of both hand and rip teeth and sections of both styles of teeth are correctly and incorrectly filed and set, so that pupils may actually see what to do and what not to do. The saw is fitted with two interchangeable handles, one showing the old-type handle and the other the new improved type. Both may be used for demonstration purposes. A textbook accompanies the saw.

BOOK ON CABINET WOODS

Albert Constantine and Son, Inc., 780 East 138th Street, New York, N. Y., have issued an interesting little booklet under the title "Fancy Cabinet Woods and Their Uses."

This little booklet contains much interesting information about fine cabinet woods, pointers about veneering, and information about glue. The booklet also contains information and prices on materials used in marquetry, inlayed work, fishing poles, archery, boat repairing, and other wood products needed by the home crafter and the school shop.

(Continued on page 11a)

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By Rufus B. Felten

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The material may be considered as a transition course in drawing, including a concise presentation of elementary principles and covering the subject of machine drawing thoroughly, leading into machine design problems.

The problems are presented by text material and layouts giving necessary information to the student.

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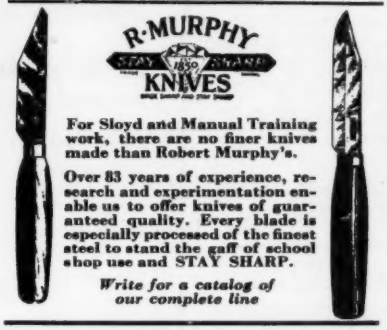

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(Continued from page 9a)

ANNOUNCE LITTLE GIANT MOTOR

The Straits Corporation, of Detroit, Mich., are marketing a Little Giant Motor Kit, which is not only an ingenious toy, but serves as the apparatus for a worth-while lesson in electro-magnetics.

The motor consists of two factory-wound magnetic coils, acting on a steel plate, hinged above them. This in turn operates a crank which turns the motor shaft, upon which is mounted a heavy flywheel. A U-contactor rigidly fixed to a control lever breaks the current through a magnet coil at the end of each down stroke of the crank. The Little Giant makes an ideal power unit for a model boat, toy locomotive, steam shovel, derrick, or any similar model which a boy may wish to build. The motor kit contains all of the equipment and parts necessary for assembling the motor and complete instructions.

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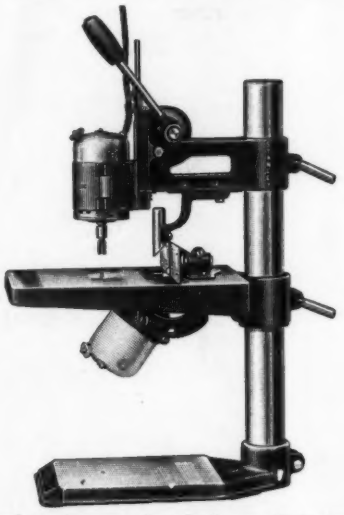
The Stanley Electric Tool Co., New Britain, Conn., has just perfected a new No. 30 electric hand router for use in the school and the home workshop. An interchangeable power unit makes it possible to use this new versatile tool as a hand



router, a bench router, or a bench shaper. It is equipped with heavy-duty ball bearings, and with a specially designed Universal motor, making it usable with either alternating or direct current.

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Instructors of mechanical drawing and machine design who are seeking project material of interest to their students will be interested in the draftsman contest just announced by the Keuffel & Esser Company, of Hoboken, N. J. Through the contest the student is given an opportunity of combining what he has learned in his studies to solve any or all of the three unusual projects which are suggested.

The firm offers three different prizes for the best designs. Project A, for elementary pupils, calls for a gear, sprocket, or pulley design, and a prize of $20. Project B, for intermediate pupils, calls for the design of a hoisting device, and a prize of $25. Project C, for advanced pupils, calls for the design of a water wheel, and a prize of $30.

Complete information may be obtained by writing to Mr. J. H. Constantine, of the Keuffel & Esser Company, Hoboken, N. J.

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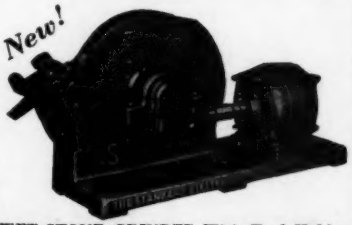

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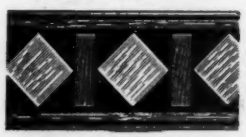

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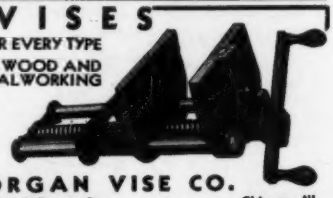

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CHART OF TYPICAL PROBLEMS IN CORNICE & SKYLIGHT LAYOUTS - BY C.H. DERBY & J.F. FABER

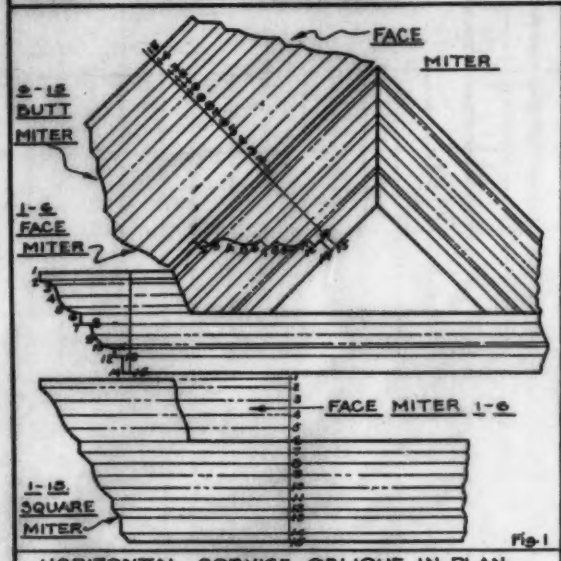

Fig. 1

METHOD TO OBTAIN THE PROFILE AND TO DEVELOP PATTERN FOR A RAKED CORNICE

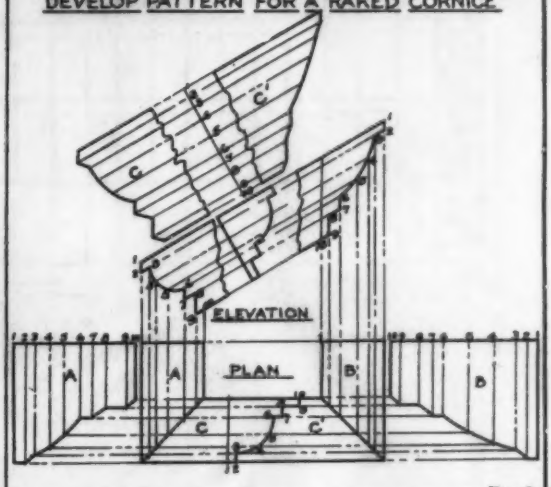

Fig. 3

HORIZONTAL CORNICE, OBLIQUE IN PLAN BUTTING AGAINST A PITCHED ROOF

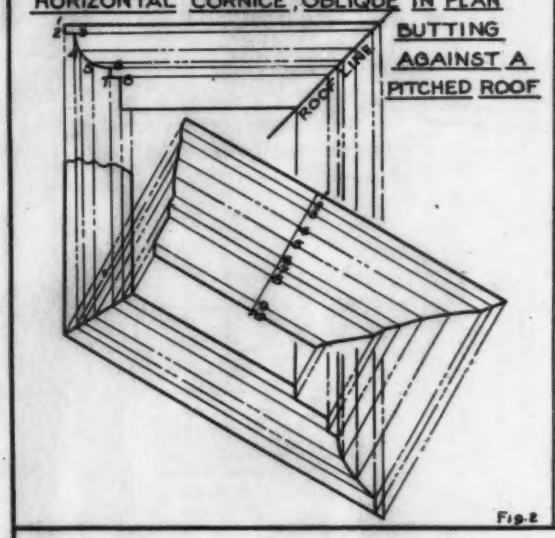

Fig. 2

OCTAGONAL BAY WINDOW BASE

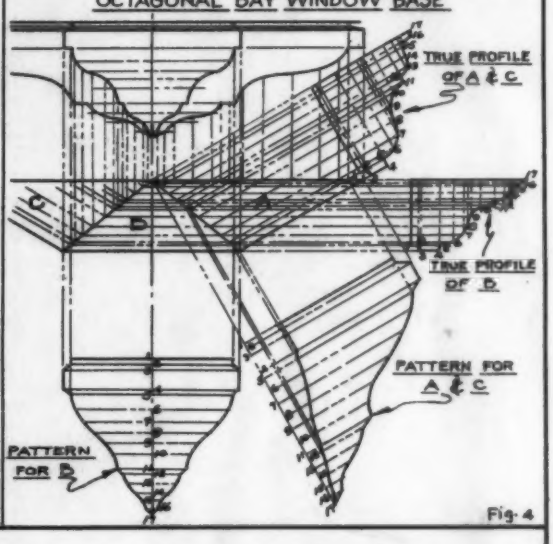

Fig. 4

PATTERNS FOR A HIPPED SKY-LIGHT

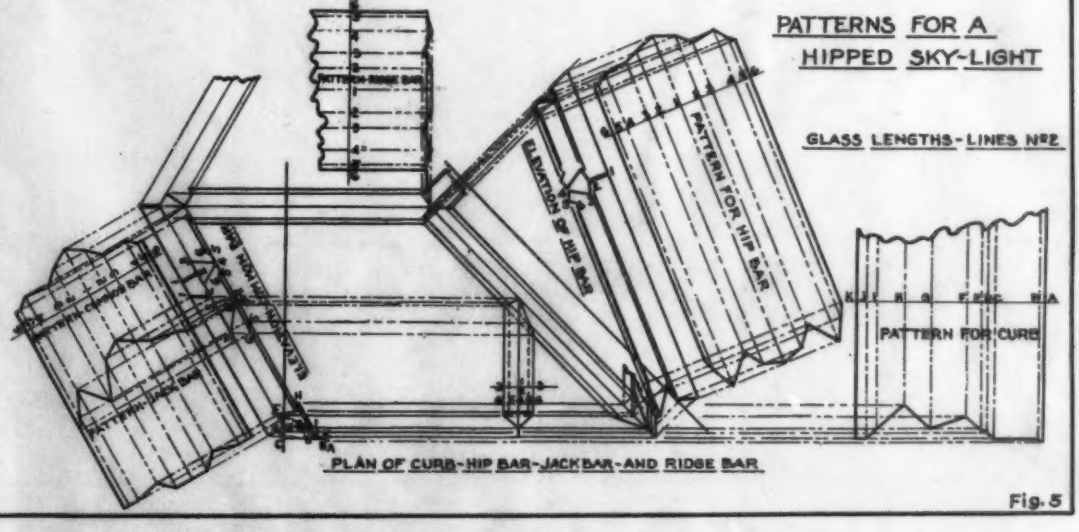
GLASS LENGTHS - LINES Nº2
PATTERN FOR HIP BAR
ELEVATION OF HIP BAR
PATTERN FOR CURB
PLAN OF CURB-HIP BAR-JACK BAR-AND RIDGE BAR

Fig. 5

TRACING SUPPLEMENT, No. 219, December, 1933
INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

Described Elsewhere in This Issue

Submitted by C. H. Derby, Erie, Pa., and J. F. Faber, New York City

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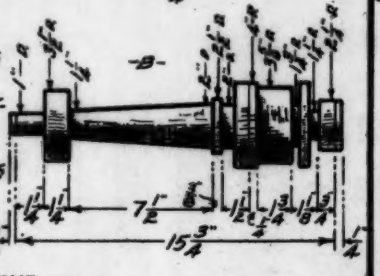
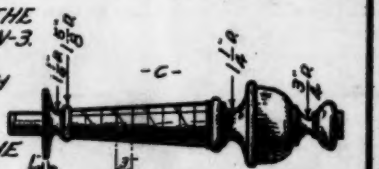
COLUMN— THE COLUMN MAY BE GLUED UP FROM ¾" STOCK. IT WILL REQUIRE SIX PIECES. SAW A GROOVE ¼" WIDE AND ¼" DEEP IN THE TWO CENTER ONES THE FULL LENGTH. THIS IS FOR THE WIRE. JOINT THE SURFACES TO BE GLUED. USE THE JOINTER BLOCK.— ADJUST A DOZEN HANDSCREWS ¼" LARGER THAN THE SIX PIECES.— TEST THE GLUE, WARM THE WOOD. GLUE.— W-3. GLUE 1½" LONG PLUGS IN EACH END. WITH A DRAWKNIFE ROUGH OFF THE CORNERS.—





DRIVE CENTERS IN MIDDLE OF PLUGS. PUT IN LATHE AND ROUGH DOWN. W-100-A. TURN THE STEPS SHOWN AT -B- W-100-F. THE CHANGE TO -C- IS EASILY ACCOMPLISHED WITH THE SKEW AND GOUGE.— THE TAPERED PART OF THE COLUMN IS NOW READY FOR THE SPIRAL.

STEP 1.— DIVIDE THE TAPERED SURFACE INTO FOUR EQUAL PARTS BY MEANS OF THE FOUR ELEMENTS X-X, Y-Y, ETC.

STEP 2.— LAYOUT THE CIRCLES M, N, O, ETC. ¾" APART.

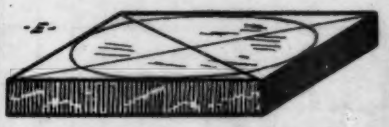
STEP 3.— DRAW THE HELIX 1, 2 WHICH FOLLOWING THE INVISIBLE LINE 3-4 APPEARS AGAIN AS 5-6, AND 7-8. YOU WILL NOTICE

THAT THERE IS ANOTHER HELIX SHOWN BY A LIGHTER LINE. THIS WILL FORM A DOUBLE SPIRAL.

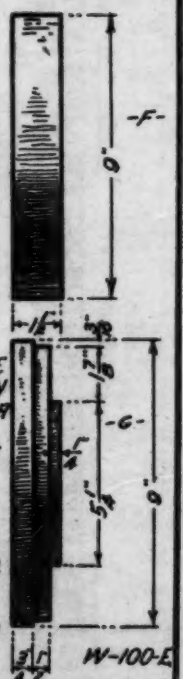
STEP 4.— WITH A BACK SAW CUT ALONG EACH SPIRAL TO A DEPTH OF ¼". WITH A SHARP KNIFE OR CHISEL ROUND OVER AS SHOWN AT -D-

STEP 5.— FINISH UP TO A FINE SURFACE WITH A FILE AND SANDPAPER. REMOVE FROM THE LATHE.

BASE— OBTAIN A PIECE FOR THE BASE OF THE LAMP AS SHOWN AT -E- IT SHOULD BE 1¾" X 9¼" X 9¼"



IN THE ROUGH. OBTAIN A FACE SIDE. DRAW THE DIAGONALS TO LOCATE THE CENTER AND THEN DESCRIBE THE 9" CIRCLE.— BANDSAW ⅛" OUTSIDE OF THE LINE. PLACE FACE PLATE ON THIS SIDE EXACTLY IN CENTER AND FASTEN WITH ¾"-10 F.H. SCREWS. IN PLACING ON THE LATHE BE SURE LEATHER WASHER IS IN ITS PLACE BETWEEN FACE PLATE AND THE COLLAR.—



TURN TO 9" DIA. AND 1½" THICKNESS AND THE STEPS SHOWN AT -G- DO THIS WITH A SKEW CHISEL.— TAKE THE STEPS SHOWN AT -H- USE SKEW AND THE ROUND NOSE.— W-100-E. TURN THE 1" HOLE WITH A ROUND NOSE ALMOST TO THE SIZE. FINISH SQUARE IN WITH A ¾" SKEW, TESTING TENON FOR A TIGHT FIT. SAND AND GLUE.— SPONGE, SAND, STAIN AND SHELLAC.— F-1, F-5.

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Designed by Clifford B. Smith, Buffalo, N. Y.